5-4930-218-14

TM 5-4930-218-14

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

LUBRICATING AND SERVICING UNIT:
POWER OPERATED, TRAILER MOUNTED, 15 CFM COMPRESSOR, RECIPROCATING GASOLINE ENGINE DRIVEN
(ELLIOTT MACHINE WORKS, INC. MODEL ENG-3A)
FSN 4930-842-8315

This copy is a reprint which includes current pages from Change 1.

HEADQUARTERS, DEPARTMENT OF THE ARMY
NOVEMBER 1974

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WARNING

POISONOUS GASES

are contained in the exhaust fumes expelled by this equipment.

DEATH

or serious illness may result if exhaust fumes are not properly expelled from enclosed areas.

DEATH

or serious injury may result if tire blows off the rim while being inflated.

DEATH OR SEVERE INJURY

might result when compressed air is used to blow dirt from skin or clothing. Air entering body openings is extremely dangerous. Avoid horseplay with compressed air.

FIRE HAZARD

is created by filling fuel tank while engine is running. Shut off engine before servicing fuel tank.

FLAMMABLE GAS

is generated in the battery of this equipment while the battery is being charged. Keep fire or flame away while servicing battery or explosion may result.

TOXIC AND FLAMMABLE FUMES

may be given off from dry cleaning solvents. Use them only in well-ventilated areas that are free from flames or sparks and open flame.

EXPLOSION HAZARD

exists when welding repairs are attempted on fuel tank.

DEATH

may result unless all gasoline fumes are purged from tank before making any repairs involving heat or flame.

SERIOUS INJURY

could result from operating the engine and compressor without having the belt guard in place. Make sure the belt guard is installed before starting operation.

INJURY

might result if air is not drained from air system before system piping is disconnected. Always drain air reservoirs before making air system repairs.

AIR TANK RUPTURE

could occur if welding repairs to the tank are made. No repairs are authorized. Replace tank if defective.

BRAKE FAILURE

will result if SERVICE and EMERGENCY brake lines that connect the trailer with the towing vehicle are reversed. SERVICE connections must terminate on the right side; EMERGENCY on the left.

TM 5-4930-218-14
C 1

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *24 October 1986*

Operator, Organizational, Direct Support And General Support Maintenance Manual

LUBRICATING AND SERVICING UNIT: POWER OPERATED, TRAILER MOUNTED, 15 CFM COMPRESSOR, RECIPROCATING GASOLINE ENGINE DRIVEN

(ELLIOTT MACHINE WORKS, INC. MODEL ENG-3A)
FSN 4930-842-8315

TM 5-4930-218-14, 22 November 1974, is changed as follows:

1. Remove and insert pages as indicated below. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

Remove pages	Insert pages
3-7	3-7/3-8

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, Operator, Organizational, Direct Support and General Support Maintenance requirements for Lubricating and Service Unit, Gas Driven, Trailer Mounted, 15 CFM Compressor (ENG-3A) (TM 5-4930-218 Series)

Technical Manual
No. 5-4930-218-14

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, D.C., *22 November 1974*

OPERATOR, ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

LUBRICATING AND SERVICING UNIT: POWER OPERATED, TRAILER MOUNTED, 15 CFM COMPRESSOR, RECIPROCATING GASOLINE ENGINE DRIVEN (ELLIOTT MACHINE WORKS, INC. MODEL ENG-3A)

FSN 4930-842-8315

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CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

This manual is for your use in operating and maintaining the Lubricating and Servicing Unit: Power Operated, Trailer Mounted, 15 CFM Compressor, Reciprocating Gasoline Engine Driven (Elliott Machine Works, Inc. Model ENG-3A).

1-2. Maintenance Forms and Records

Maintenance forms, records, and reports that you are required to use are explained in TM 38-750.

1-3. Reporting of Errors

You can improve this manual by calling attention to errors and by recommending improvements, using DA Form 2028 (Recommended Changes to Publications), or by a letter, and mail directly to Commander, US Army Troop Support Command, ATTN: AMSTS-MPP, 4300 Goodfellow Boulevard, St. Louis, Missouri 63120. A reply will be furnished directly to you.

1-4. Equipment Serviceability Criteria

This equipment is not covered by an ESC.

1-5. Destruction of Army Materiel to Prevent Enemy Use

For instructions regarding destruction of equipment to prevent enemy use, refer to TM 750-244-3.

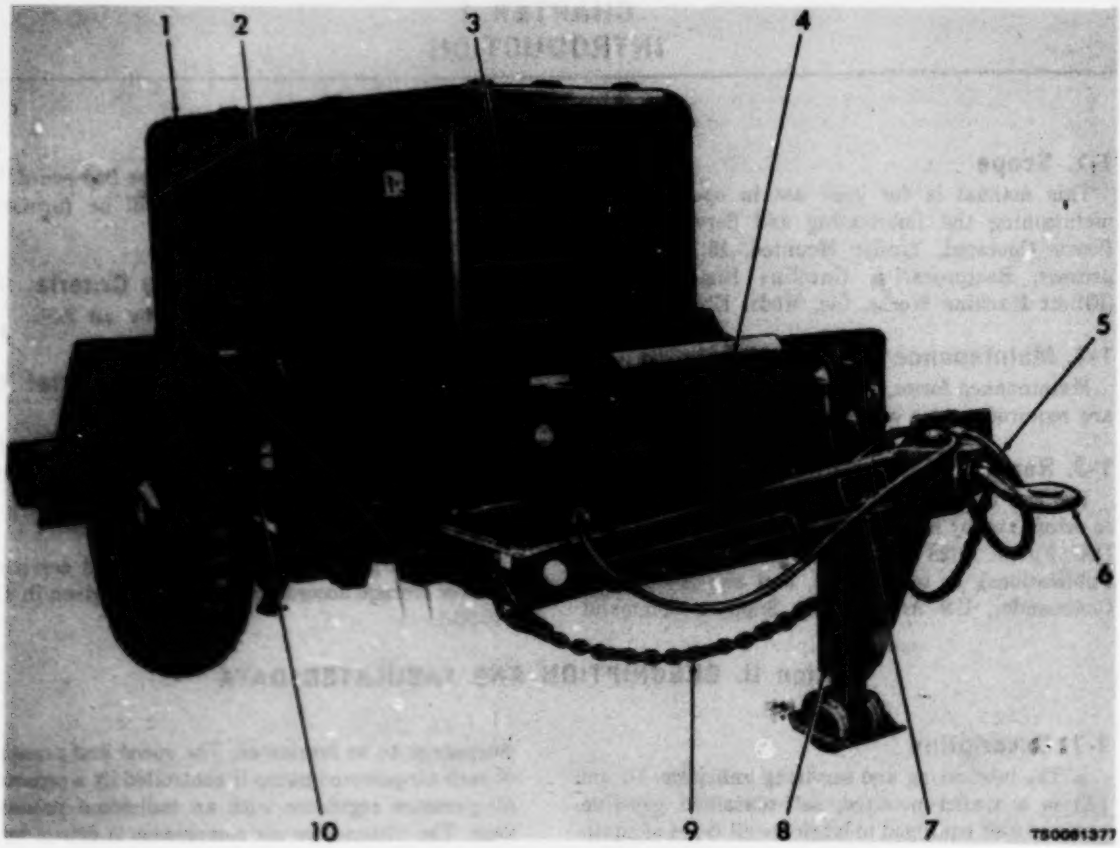
1-6. Administrative Storage

You must prepare the lubricating and servicing unit for storage according to procedures given in TM 740-90-1.

Section II. DESCRIPTION AND TABULATED DATA

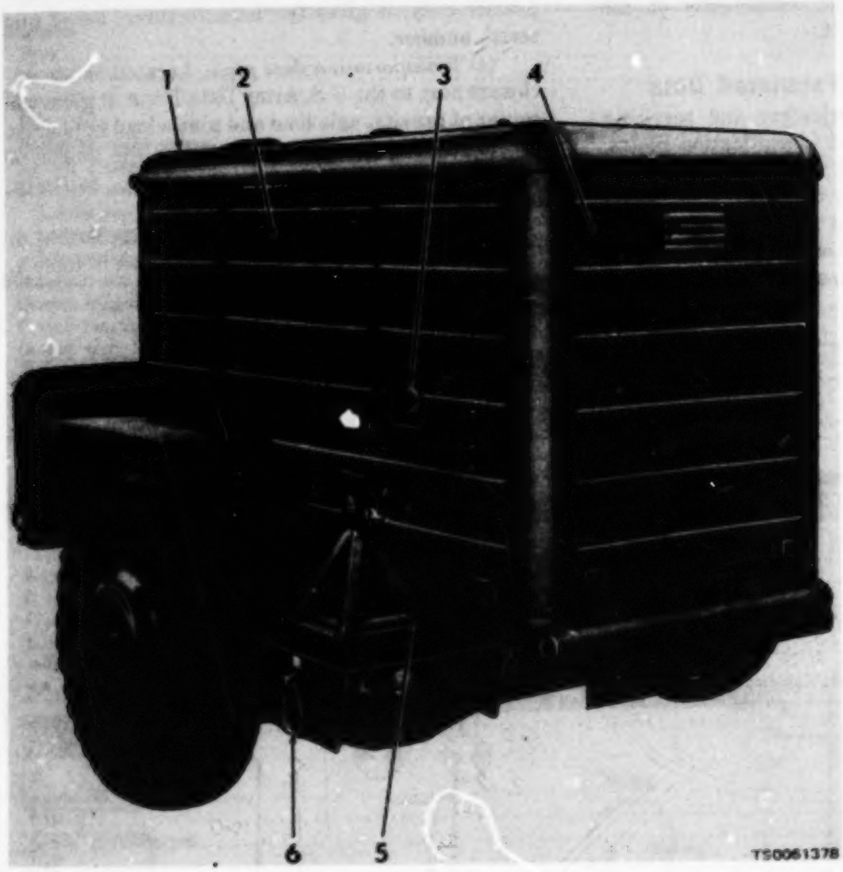
1-7. Description

a. The lubricating and servicing unit (figs. 1-1 and 1-2) is a trailer-mounted, self-contained gasoline-powered unit equipped to lubricate all types of equipment and components. The unit consists of three storage tanks, three pumps (grease, engine oil, and gear oil), five hose reels (two for grease, one for engine oil, one for gear oil, and one for air service), one transfer pump, and a set of hand guns, adapters, couplings, etc. for specialized lubrication. Compressed air forces the desired lubricant from its storage tank through the reel-mounted hose to the component to be lubricated. The speed and pressure of each air-powered pump is controlled by a separate air pressure regulator with an individual pressure gage. The piston-type air compressor is driven by a belt and pulley arrangement from the four-cylinder, four-cycle, air-cooled gasoline engine. The hose reel bank, consisting of the five hose reels, is mounted at the rear of the lubricator. Accessory drawers for stowage of specialized lubricating equipment are located directly below the hose reels. An enclosure with doors on each side protects the unit from inclement weather.



1. Enclosure
2. Right side door
3. Front door
4. Brake system air receiver
5. EMERGENCY brake system hose
6. Lunette
7. SERVICE brake system hose
8. Landing gear
9. Safety chain
10. Wheel chock

Figure 1-1. Lubricating and servicing unit, right front, three-quarter view.



1. Enclosure
2. Left side door
3. Fuel filler
4. Rear door
5. Safety stand
6. Lifting and tiedown ring

Figure 1-2. Lubricating and servicing unit, left rear, three-quarter view.

b. The maintenance paragraphs of this manual contain detailed descriptions of components of the lubricating and servicing unit.

1-8. Identification and Tabulated Data

a. Identification. The lubricating and servicing unit has five major data and identification plates.

(1) *U.S. Army data plate.* Located on the right side of the enclosure. It gives the description, serial number, manufacturer, model and dimensions.

(2) *Engine data plate.* Located on the engine block. It gives the manufacturer, serial number, and operating characteristics.

(3) *Compressor data plate.* Located on the compressor body; it gives the manufacturer, model and serial number.

(4) *Transportation data plate.* Located on the enclosure next to the U.S. Army Data Plate. It gives the center of gravity, axle load and pintle load in pounds.

(5) *Trailer data plate.* Located on the tongue of the trailer and contains the FSN, capacity, specification number, and weight.

b. Tabulated Data. Tabulated data applicable to the lubricating and servicing unit is given in table 1-1.

Table 1-1. Tabulated Data

OPERATOR'S TABULATED DATA	
Manufacturer	Elliott Machine Works
Model	ENG-3A
FSN	4930-842-8315
Type	Compressed air operated
Compressor drive	Gasoline engine
Lubricants dispensed	Grease, engine oil, and gear oil
Number of hose reels	5
Hose reel application	
Grease	2
Engine oil	1
Gear oil	1
Compressed air	1
Type of mounting	Trailer
Brake type	Air
ORGANIZATIONAL MAINTENANCE TABULATED DATA	
Engine	Military Standard Engine; refer to TM 5-2805-203-14
Air compressor	
Manufacturer	Champion
Model	R15HU
Type	Reciprocating piston
Drive	Belt
Displacement	15 cfm (cubic feet per minute)
Stroke	3 inch
Operating pressure	175 psi (pounds per square inch)
Transfer pump	
Manufacturer	Balcrank, Inc.
Part No.	44701
Operating pressure	75 to 150 psi
Alcohol dispenser	
Manufacturer	Norgren
Model	10-002
Trailer	
Manufacturer	Elliott Machine Works
Part No.	4445B
FSN	
Length	172 in.
Width	96 in.
Height	48 in.
Weight	2730 lb
Lubricant pumps	
Manufacturer	Balcrank, Inc.
High pressure pump	43881
High pressure pump ratio	50 to 1
Low pressure pump	43877
Low pressure pump ratio	10 to 1
Types of lubricants required	
High pressure pump	General purpose grease
Low pressure pump	Engine and gear oil

Table 1-1. Tabulated Data — Continued

ORGANIZATIONAL MAINTENANCE TABULATED DATE — continued	
Batteries	
Type	24 volts, negative ground
Number	2
Capacities	
Fuel tank	10 gallon
Hydraulic brake system	1-1/8 quart
Alcohol dispenser	1/4 quart
Lubricant storage bins	
Lubricating grease	175 lb
Lubricating gear oil	27 gallon
Lubricating oil	27 gallon
Dimensions and weight	
Overall height	76-3/4 in.
Overall length	173-3/8 in.
Overall width	96 in.
Shipping weight	5500 lb
Shipping cubage	758 cu ft
Center of gravity	See data plate

c. *Wiring Diagrams.* Refer to figure 1-3 for the engine electrical system wiring diagram. Refer to figure 1-4 for the chassis electrical system wiring diagram.

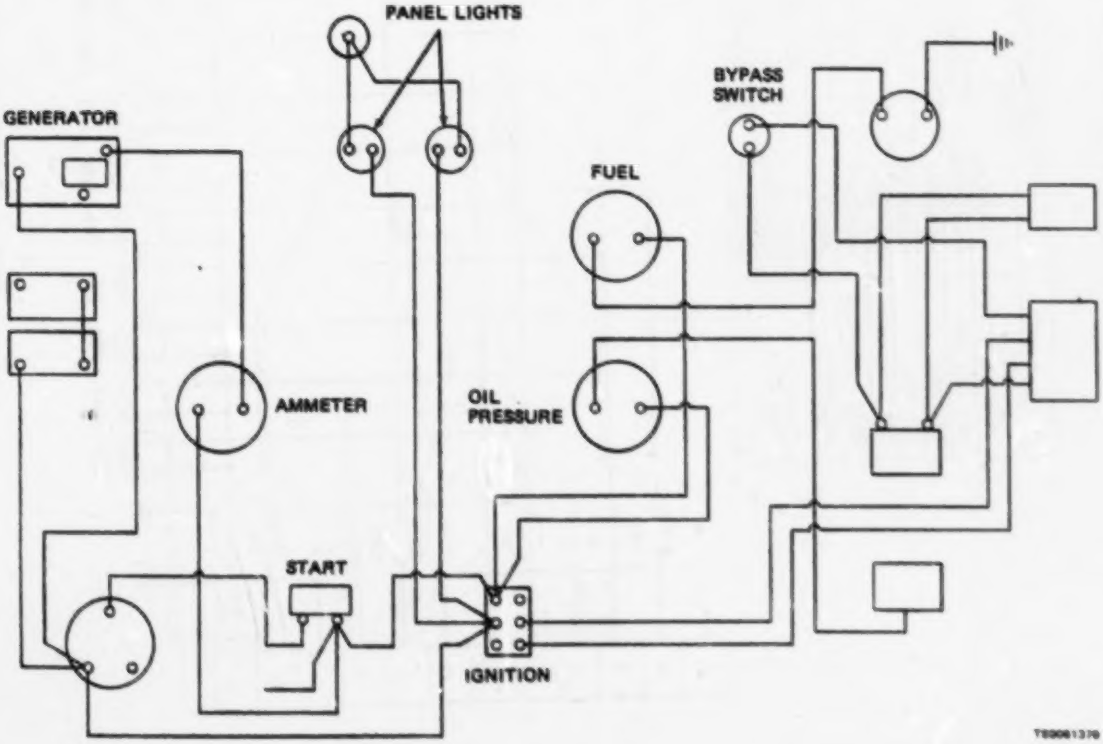


Figure 1-3. Engine electrical system wiring diagram.

COMPONENT REFERENCE LIST

REF. DESIGNATION	PART No.	DESCRIPTION
CB1, CB2, CB3	MIL-C-15581/1	CIRCUIT BREAKER - 15 AMP
DS1, DS3	MS35423-1	LIGHT, MARKER, CLEARANCE - SERVICE (AMBER)
DS2, DS4	MS35424-1	LIGHT, MARKER, CLEARANCE - BLACKOUT (AMBER)
DS5 THRU DS11	MS35423-2	LIGHT, MARKER, CLEARANCE - SERVICE (RED)
DS12 THRU DS15	MS35424-2	LIGHT, MARKER, CLEARANCE - BLACKOUT (RED)
DS16, DS17	MS51330	STOPLIGHT-TAILLIGHT, VEHICULAR - 24 VOLT BLACKOUT TAIL, BLACKOUT STOP
DS18, DS19	D13212E4091	TAILLIGHT
J1	MS75021-1	CONNECTOR, RECEPTACLE

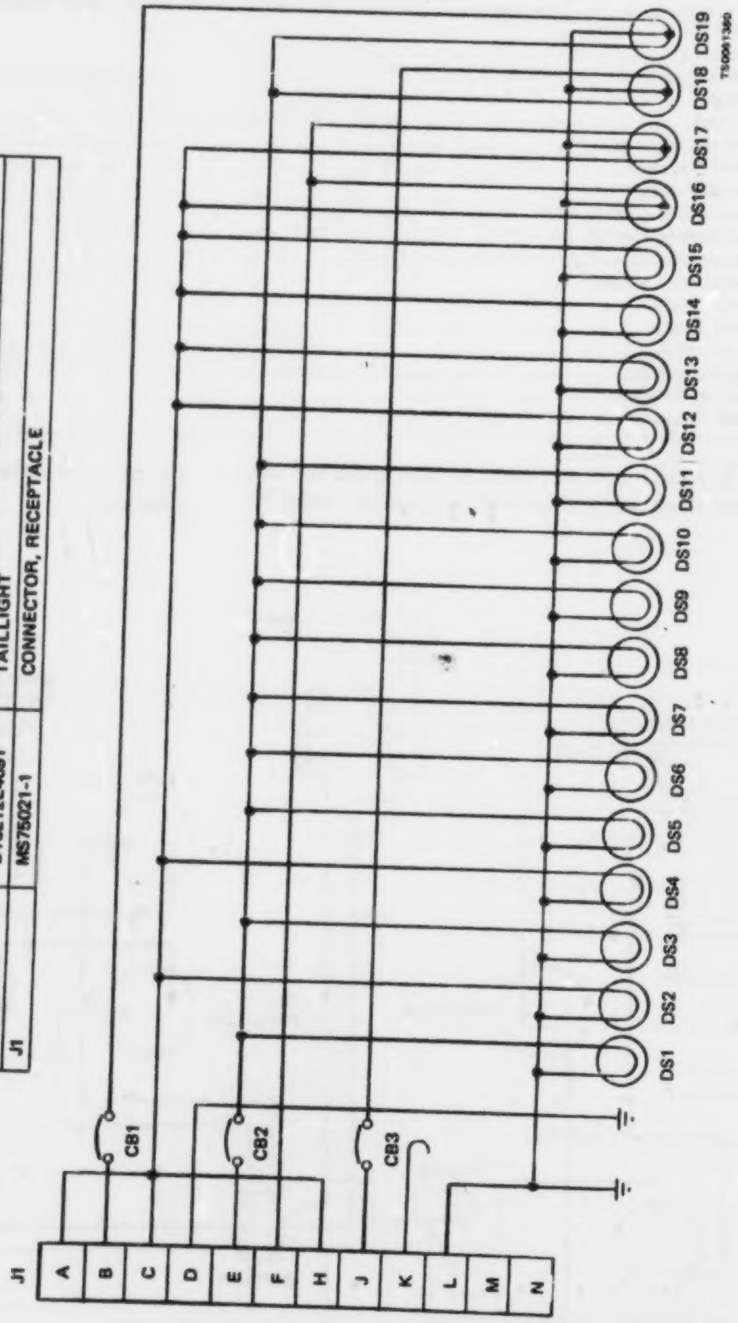


Figure 1-4. Chassis electri

d. Lubrication Hose Diagram. Refer to figure 1-5 for a lubrication hose diagram.

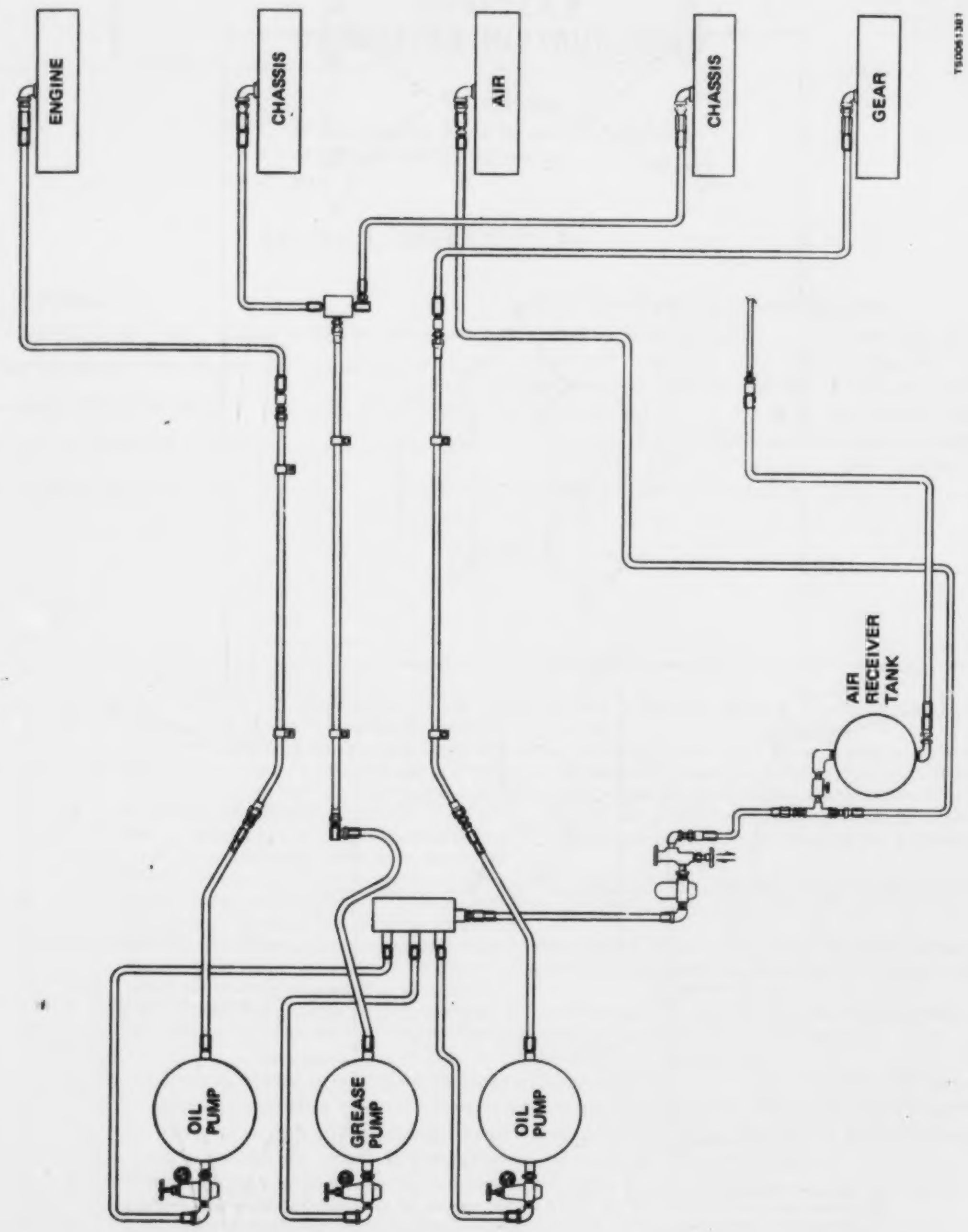


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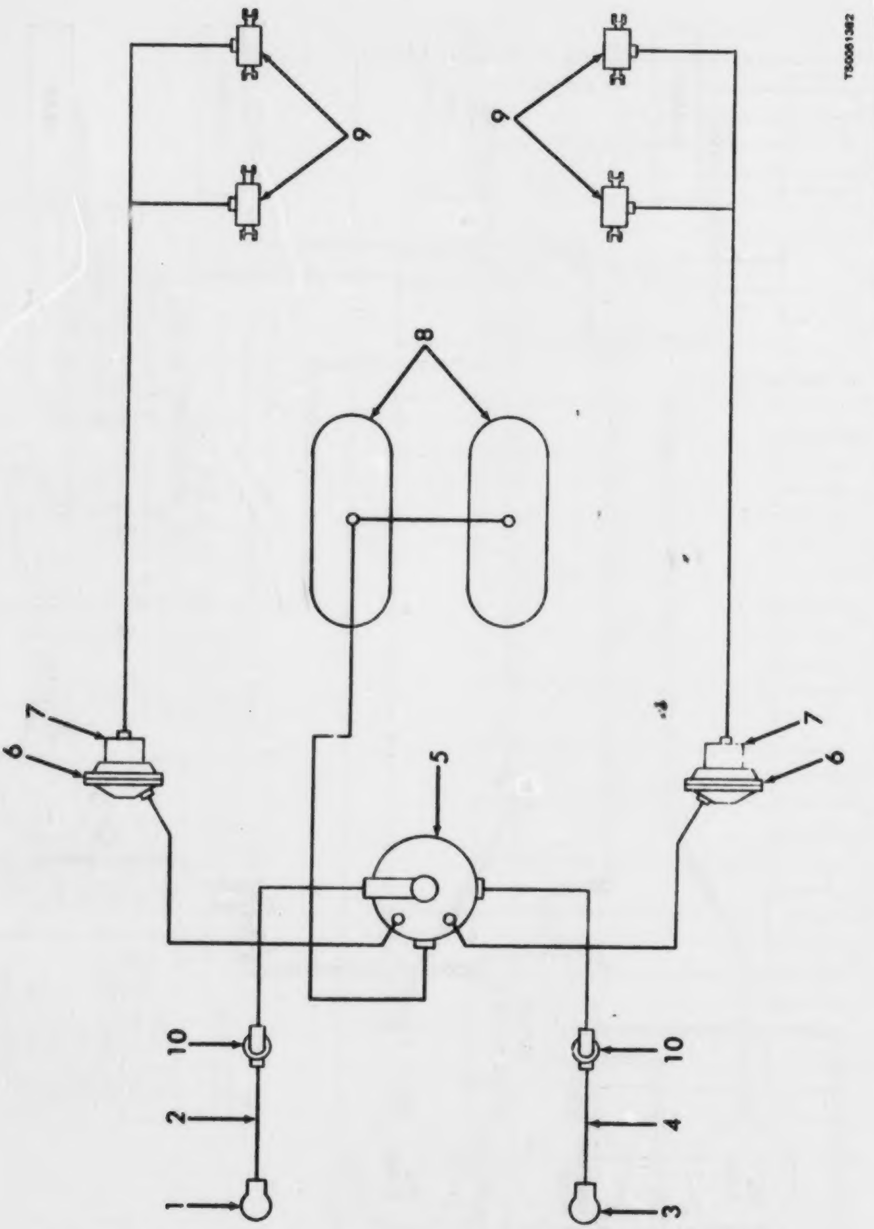
Figure 1-5. Lubrication hose diagram.

e. Air-hydraulic Brake Diagram. Refer to figure 1-6 for the air-hydraulic brake diagram.



1. Service coupling
2. Service hose
3. Emergency coupling
4. Emergency hose
5. Brake relay valve
6. Air chamber
7. Brake master cylinder
8. Air reservoir
9. Wheel cylinder
10. Air cleaner

Figure 1-6. Air-hydraulic brake diagram.

1-9. Differences in Models

This manual covers only Lubricating and Servicing Unit, Model ENG-3A, manufactured by Elliott Machine Works. No known differences ex units manufactured under this model nu

CHAPTER 2
OPERATING INSTRUCTIONS

WARNING
If equipment fails to operate, refer to troubleshooting procedure in Chapter 3.

Section I. OPERATING PROCEDURES

2-1. General

This section contains information and guidance for the personnel responsible for operation of the lubricating and servicing unit. This section gives instructions on starting and stopping the engine and basic operations of the unit.

2-2. Controls and Instruments

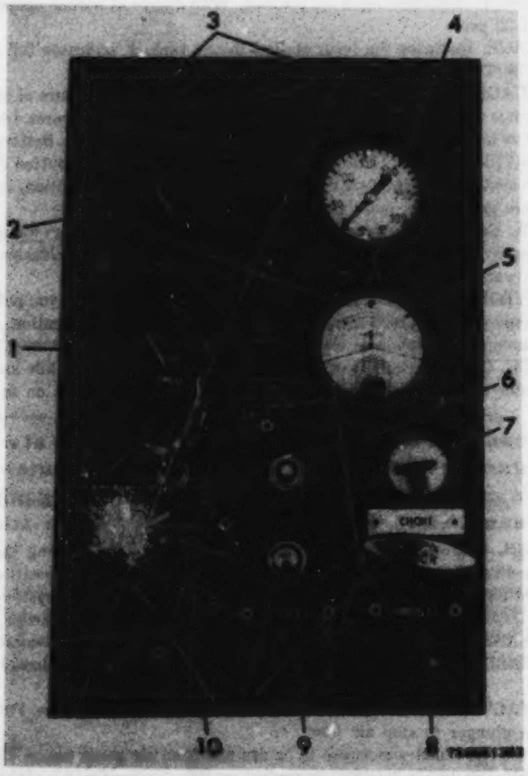
Before attempting to operate the lubricating and servicing unit, you must become familiar with all controls and instruments provided on the unit. Refer to table 2-1 for a complete description and identification of all controls and instruments used on the lubricating and servicing unit. The controls and instruments are illustrated in figures 2-1 through 2-6.

Table 2-1. Controls and Instruments

Fig. No.	Index No.	Description
2-1	1	OIL PRESSURE GAGE. Indicates engine oil pressure. With engine at normal operating temperature, gage must indicate between 20 and 35 psi.
2-1	2	FUEL LEVEL GAGE. Indicates the level of fuel in the tank. F indicates full tank. E indicates empty tank.
2-1	3	PANEL LIGHT SWITCH. Controls the operation of panel lights.
2-1	4	AIR PRESSURE GAGE. Indicates pressure of air reservoir. Working pressure of air system is between 150 and 175 psi.
2-1	5	AMMETER. Indicates the rate of charge or discharge of the battery in amperes. Immediately after you start the engine, ammeter will show high rate of charge and will then taper off to near zero. Battery charge is replenished after starting.
2-1	6	OIL PRESSURE OVERRIDE SWITCH. When pressed and held, this pushbutton closes the starting circuit through the low oil pressure switch to allow starting during a low oil pressure condition. After starting, you can release switch when oil pressure gage shows more than 10 psi.
2-1	7	CHOKE CONTROL. Controls the operation of the engine choke. Pull out to aid starting of cold engine. When engine starts and warms up, push in choke control to maintain smooth engine operation. Make sure you have control fully in when engine is warmed to operating temperature.
2-1	8	THROTTLE CONTROL. Controls maximum engine operating speed. When you pull out on the control, engine speed increases. To lock speed setting, turn throttle control clockwise. During operation, engine speed will reduce to idle when preset air pressure of air system is attained.
2-1	9	STARTER SWITCH. Controls cranking of engine. When pressed and held while low oil pressure switch is held, it causes the starting motor to crank the engine. You must turn ignition switch on to start engine. **CAUTION** **Do not crank the engine for more than 30 seconds at a time or you will burn out the starting motor. Allow a minimum of 2 minutes between cranking attempts to permit starting motor to cool. Notify organizational maintenance if you cannot start the engine after four or five attempts.**
2-1	10	IGNITION SWITCH. Controls starting and stopping of engine by grounding the magneto. When moved to the ON position, switch allows engine to be started. When moved to the OFF position, engine stops.
2-2	1	ALCOHOL DISPENSER NEEDLE VALVE. Controls flow of alcohol into air system to prevent freezing during operation in subfreezing conditions. Normal setting is one-fourth turn counterclockwise from fully closed position.
2-2	2	ALCOHOL DISPENSER SIGHT GAGE. Indicates if supply of alcohol is available during operation.
2-2	3	ALCOHOL DISPENSER PLUG HANDLE. Facilitates plug removal to fill alcohol dispenser. Turn counterclockwise to remove.
2-2	4	AIR PLUNGER VALVE. Controls flow of air from air reservoir to air system. Pull out plunger to allow air flow to air system. Push in plunger to stop air flow.
2-2	5	CONDENSATE VALVE. Enables moisture to be drained from air pump motor. One valve is provided on each of three motors. Open valve while air pressure is applied to dispel moisture.
2-2	6	CIRCULATING VALVE. Permits lubricants to be circulated through pump and back into lubricant compartment. Open

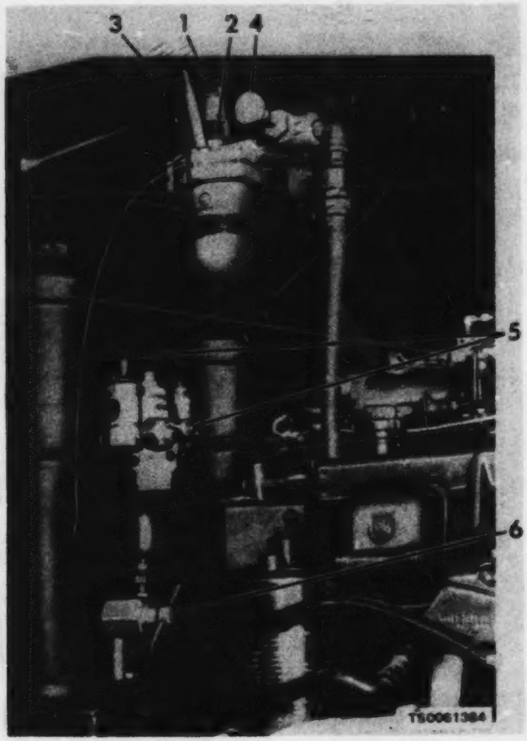
Table 2-1. Controls and Instruments — Continued

Fig. No.	Index No.	Description
		valve to charge pump with lubricant at starting. Close during dispensing operation. One circulating valve is provided in each pump.
2-3	1	AIR PRESSURE REGULATOR. Adjusts air pressure applied to lubricant pump. When pressure is increased, it causes lubricant to be discharged at higher pressure. Adjust pressure to provide proper lubricant flow from dispensing nozzle. One regulator is provided for each lubricant pump.
2-3	2	AIR PRESSURE GAGE. Indicates air pressure applied to lubricant pump to permit pressure adjustment to predetermined setting.
2-4	1	GEAR OIL PINTMETER DISPENSER. Provides a method of dispensing a metered amount of gear oil. Dial pointer must be adjusted to zero before dispensing. Squeezing trigger causes oil to be dispensed. Dial pointer indicates pints of oil dispensed.
2-4	2	GREASE DISPENSER. Controls dispensing of chassis lubricating grease. Squeezing the trigger causes grease to flow from the nozzle. Two grease dispensing hose reels are provided.
2-4	3	ENGINE OIL QUARTMETER DISPENSER. Provides a method of dispensing a metered amount of engine oil. Dial pointer must be adjusted to zero before dispensing. Squeezing trigger causes oil to be dispensed. Dial pointer indicates quarts of oil dispensed.
2-4	4	AIR RECEIVER DRAIN VALVE. Drains moisture and air from air receiver. Turn counterclockwise to open valve, clockwise to close.
2-4	5	AIR HOSE QUICK-DISCONNECT COUPLER. Supplies connection for quick-disconnect air tools and chucks.
2-4	6	HOSE REEL LOCK. Locks hose reel to prevent excessive hose from unwinding. One lock is provided for each reel.
2-5	1	ENGINE EXHAUST DIVERTER. Controls flow of engine exhaust either to provide warming for the lubricant dispensing tank or to divert the exhaust directly to the atmosphere.
2-5	2	AIR RECEIVER SHUTOFF VALVE. Controls the flow of air from the air receiver.
2-6	1	AIR PRESSURE SAFETY VALVE. Protects the air receiver and the compressor intercooler from excessive air pressure. Pulling out on the valve ring releases air and provides a check of the valve operation.



1. Oil pressure gage
2. Fuel level gage
3. Panel light switch
4. Air pressure gage
5. Ammeter
6. Oil pressure override switch
7. CHOKE control
8. THROTTLE control
9. STARTER switch
10. IGNITION switch

Figure 2-1. Lubricating and servicing unit control panel.



1. Alcohol dispenser needle valve
2. Alcohol dispenser sight gage
3. Alcohol dispenser plug handle

4. Air plunger valve
5. Condensate valve
6. Circulating valve

Figure 2-2. Air and lubricant pump controls.

1. Air pressure regulator
2. Air pressure gage

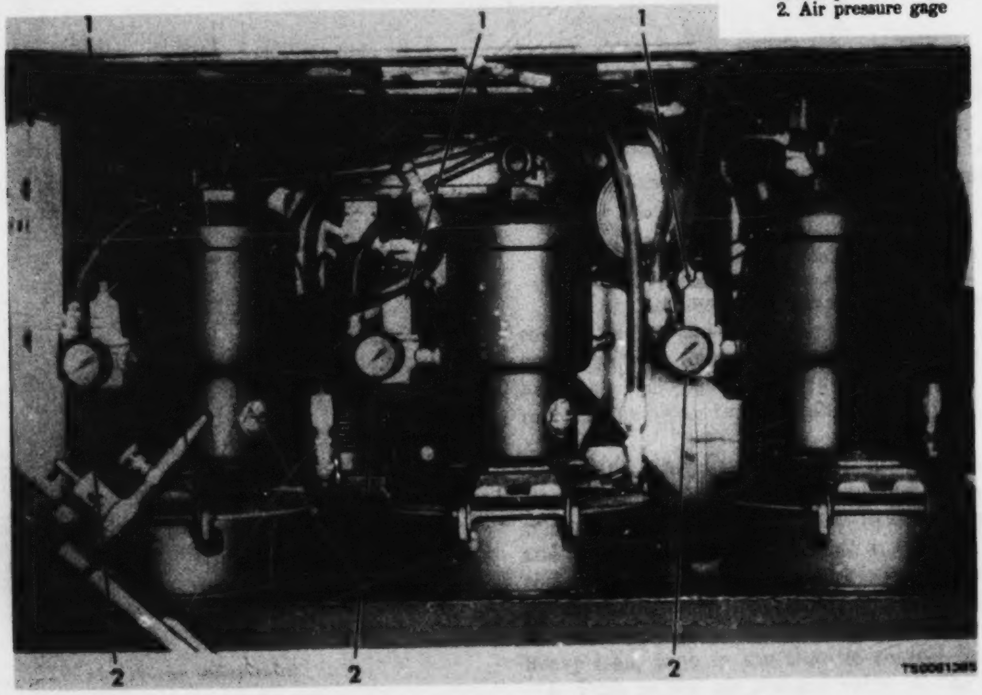
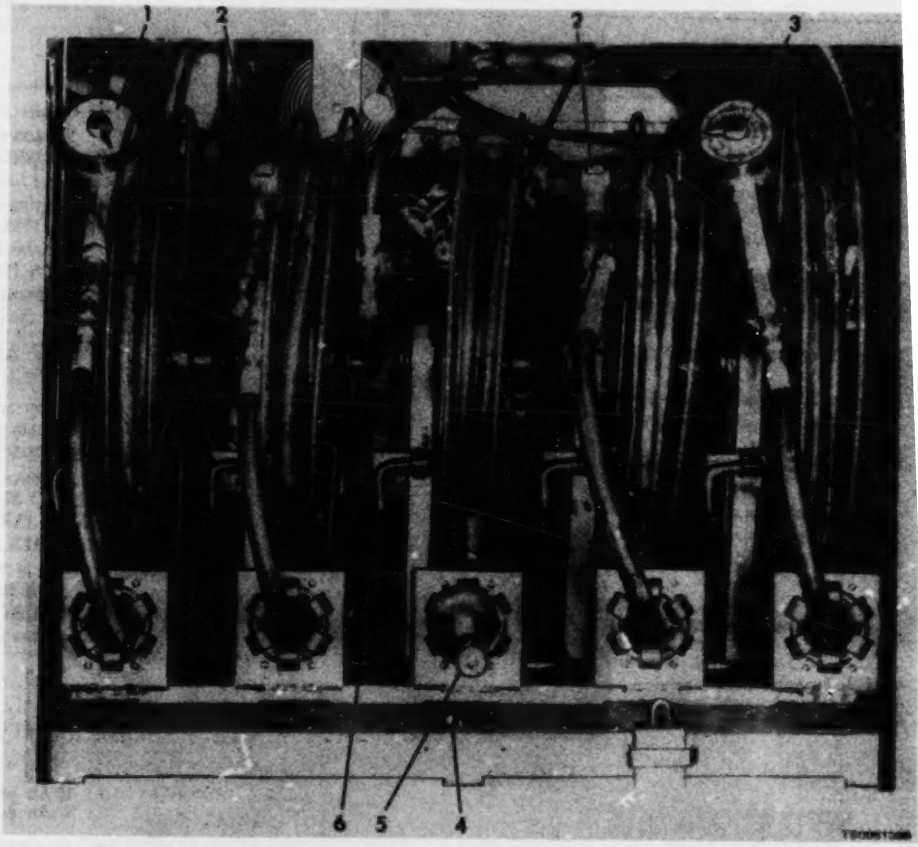
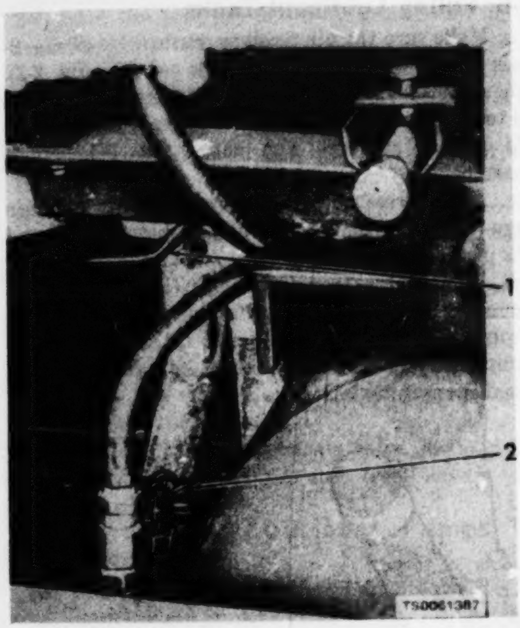


Figure 2-3. Lubricant pump air pressure regulator and gage.



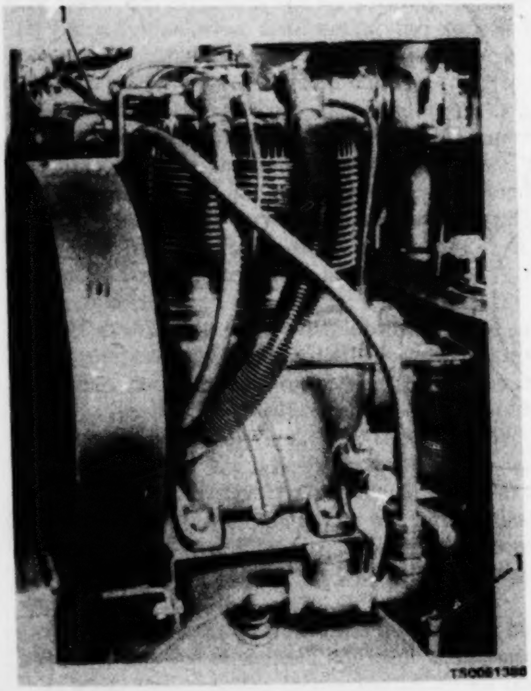
1. Gear oil pintmeter dispenser
2. Grease dispenser
3. Engine oil quartmeter dispenser
4. Air receiver drain valve
5. Air hose quick-disconnect coupler
6. Hose reel lock

Figure 2-4. Hose reel compartment controls.



1. Engine exhaust diverter
2. Air receiver shutoff valve

Figure 2-5. Exhaust diverter and air receiver shutoff valve.



1. Air pressure safety valve

Figure 2-6. Air pressure safety valve.

2-3. Starting

a. Preparation for Starting. Before starting, be sure that you perform the necessary daily preventive maintenance services listed in paragraph 3-5.

b. Electric Starting of Engine.

(1) Push the engine exhaust diverter (1, fig. 2-5) into position to direct the engine exhaust gases to the atmosphere outside the unit.

WARNING

Do not operate the engine indoors without taking precautions to vent the exhaust gases. Engine exhaust contains carbon monoxide, a colorless, odorless, deadly poisonous gas.

(2) Pull out the choke control (7, fig. 2-1).

(3) Open the throttle control (8) about 3/4 inch. Turn control clockwise to lock in position.

(4) Place the ignition switch (10) to ON. Depress and hold down the override switch (6).

CAUTION

When cranking the engine, you must take care to prevent starting motor overheating. Limit your cranking intervals to 30 seconds and wait 2 minutes between attempts if the engine does not start the first time. If the engine does not start after you have cranked it four or five times, refer problem to organizational maintenance.

(5) Push starter switch (9).

(6) When engine starts, release starter switch (9).

(7) When oil pressure gage (1) exceeds 20 psig, release the bypass switch (6).

(8) Throttle (8) should be pulled all the way out for normal operation after engine reaches operating temperature.

NOTE

Engine rpm under load should be 2200 rpm. See TM 5-2805-203-14 for engine rpm adjusting instructions.

(9) As the engine warms up, push in the choke control in increments to maintain smooth engine operation with minimum choke setting. You should have the choke pushed in fully before the engine reaches operating temperature.

2-4. Stopping Engine

a. If the engine has been running under heavy compressor load and is hot, push in the throttle control (8, fig. 2-1) to run the engine at fast idle until it cools. Make sure the air is shut off to prevent continued operation of the compressor. When the engine has cooled enough to dissipate the heat caused by the heavy load, push in the throttle control fully.

b. Push in the air plunger valve (4, fig. 2-2).

c. Open the air receiver drain valve (4, fig. 2-4) to drain any moisture that has condensed in the air receiver.

d. Operate the ignition switch (10, fig. 2-1) to OFF to stop engine.

2-5. Operating Under Usual Conditions

a. Start the equipment as indicated in paragraph 2-3.

b. Refer to following paragraphs 2-6 through 2-9 for complete information on operation of the lubricating and servicing unit under usual conditions.

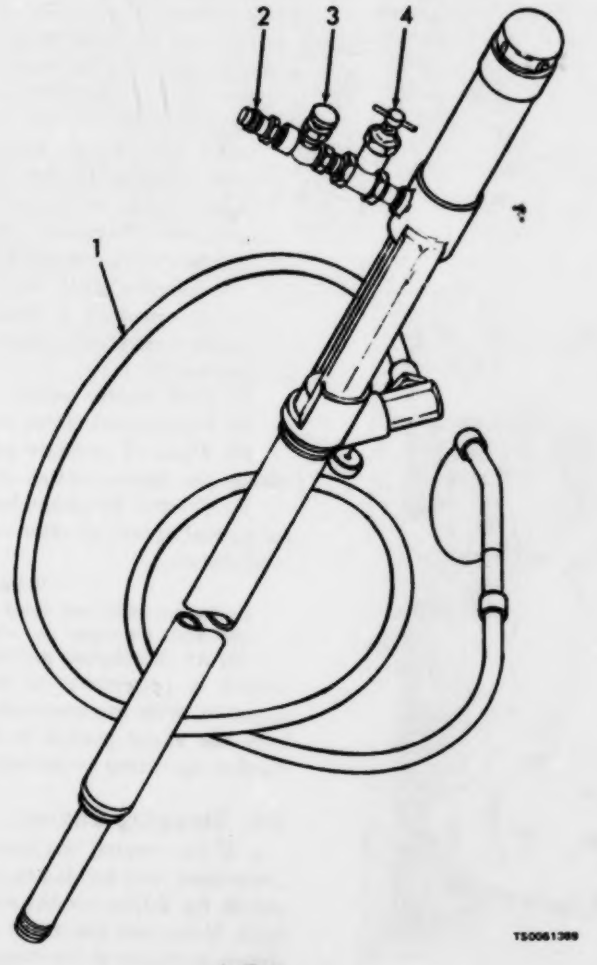
2-6. Filling Lubricant Tanks

a. Make sure the air receiver drain valve (4, fig. 2-4) is closed. Close the air plunger valve (4, fig. 2-2).

b. Air pressure in the tank will automatically build up to 175 pounds. This pressure is preset to cut out at 175 pounds pressure and cut in at 145 pounds pressure.

c. Allow pressure to build until the air pressure gage (4, fig. 2-1) shows a reading of between 150 and 175 pounds air pressure.

d. Remove the transfer pump (fig. 2-7) from its mounting and install in drum of lubricant to be dispensed. You cannot use the transfer pump to pump heavy grease. Grease must be hand-packed in the dispenser tank.



1. Hose
2. Quick air coupler
3. Air valve
4. Oiler assembly

Figure 2-7. Lubricant transfer pump.

e. Remove the transfer pump hose assembly (1, fig. 2-7) from the tool box assembly and install on the transfer pump assembly.

f. Pull out the air hose quick-disconnect coupler (5, fig. 2-4) and attach it to the quick air coupler (2, fig. 2-7) on the transfer pump.

g. Open the fill cover and insert the transfer hose into the tank to be filled.

h. Open the air plunger valve (4, fig. 2-2).

i. Open the air valve (3, fig. 2-7) on the transfer pump to the required volume.

j. When the dispenser tank is filled, close air plunger valve (4, fig. 2-2).

NOTE

Always keep lubricant containers three-quarters full.

k. Clean and store the transfer pump and hose in their respective positions.

l. Open the air receiver drain valve (4, fig. 2-4) to drain moisture and air pressure from the air tank.

2-7. Preparing Lubricant Pumps for Operation

a. Fill lubricant tanks (para 2-6).

b. Open the air plunger valve (4, fig. 2-2) and close air receiver drain valve (4, fig. 2-4). Allow air pressure to build up to working pressure level of 150 to 175 psi.

c. Turn the handles of the air pressure regulators (1, fig. 2-3) clockwise, until set at the desired air pressure, as registered on the air pressure gages (2).

d. Air pressure to each pump must be adjusted at the individual pump. Turn the handle of the air pressure regulator (1, fig. 2-3) clockwise to increase air pressure, and counterclockwise to decrease air pressure. The exact air pressure to operate pumps must be based on delivery rate required and viscosity.

e. Open the circulating valve (6, fig. 2-2) of each pump by turning the valve handle two full turns counterclockwise.

f. After charging pump with lubricant, close each circulating valve by turning it all the way clockwise.

g. Open the hose reel access door, release the reel lock (6, fig. 2-4) of the lubricant reel to be used. Unhook the dispenser (1, 2, or 3, fig. 2-4) from the bracket, and pull the hose from the reel.

h. Open the dispenser (1, 2, or 3, fig. 2-4) by depressing the trigger. The pump will automatically fill the line and force lubricant through the dispenser nozzle or adapter as long as you hold the trigger depressed.

i. Allow lubricant to flow until the line has been purged of air, and no aerated lubricant is dispensed.

j. When you complete this operation on all three lubricant hoses, the lubricating unit is ready to dispense lubricants.

2-8. Dispensing Lubricants

a. Dispensing General Purpose Grease.

(1) Prepare the grease pump for operation (para 2-7).

(2) Release the hose reel lock (6, fig. 2-4) from one of the general purpose grease reels (second or fourth reel) and pull out the required length of hose.

(3) Select the proper adapter from the upper drawer (fig. 2-8 or 2-9), or lower drawer (fig. 2-10) and connect it to the hose end.

(4) Clean each grease fitting of the part being lubricated or you may force dirt into the bearing point. Attach the adapter to the fitting and squeeze the trigger.

(5) When all the old grease has been forced out of the part being lubricated, release the trigger. Disconnect the adapter and go on to the next fitting.

(6) When lubricating is complete, disconnect the adapter from the dispenser. Wipe it clean and return it to the equipment drawer. Rewind the hose on the reel and replace the dispenser on the bracket. Secure the hose reel lock.

b. Dispensing Gear Oil.

(1) Prepare the gear oil pump for operation (para 2-7).

(2) Release the hose reel lock (6, fig. 2-4) and pull out the required length of hose. Set meter pointer on the pintmeter dispenser (1) to "0".

CAUTION

Do not try to set the pointer beyond the "0" position.

(3) Clean around the filler plug opening of the unit to be filled. Remove the filler cap or plug. Insert the valve nozzle into the filler opening and add the proper amount of oil.

(4) Clean and replace the filler plug or cap.

(5) Rewind the hose, set the hose reel lock and hang the pintmeter dispenser on the bracket.

c. Dispensing Engine Oil.

(1) Prepare the engine oil pump for operation (para 2-7).

(2) Release the hose reel lock, remove the quartmeter dispenser (3, fig. 2-4) from the bracket, and pull out the desired amount of hose.

(3) Set the meter pointer on the quartmeter dispenser to "0".

CAUTION

Do not try to set the pointer beyond the "0" position.

(4) Clean around the filler plug. Remove filler plug, insert nozzle, and fill reservoir to proper level. Quantity will be indicated on the quartmeter dispenser.

(5) Clean and replace plug. Rewind hose, set hose reel lock, and return dispenser to bracket.

d. Use of Air Chuck.

(1) Remove the air chuck and pressure gage from the upper equipment drawer.

WARNING

When inflating a tire, stand to one side of it, not in front. Serious injury or death could result if the tire blows off the rim.

(2) Attach the air pressure gage and air chuck to the air hose quick-disconnect coupler (5, fig. 2-4).

(3) When you inflate a tire, press the air chuck down firmly on the tire valve and depress valve lever to force air into the tire. When the proper pressure has been reached, release lever and lift off the air chuck.

(4) After air service operations have been performed, rewind the air reel hose on reel and disconnect the air pressure gage and air chuck from the air line coupler.

(5) Lock the hose reel lock and replace the a chuck and pressure gage in the upper equipme drawer.

WARNING

Do not use compressed air for blowing dirt from your clothing or skin. Air can enter body openings and cause severe injury or death. Avoid horseplay with compressed air.

2-9. Shutdown Procedures

a. With the pumps operating, open the condensat valve (5, fig. 2-2) by turning the valve lever in a coun terclockwise direction. Exhausting air will carry ac cumulated moisture from the pump.

b. Stop the engine (para 2-4).

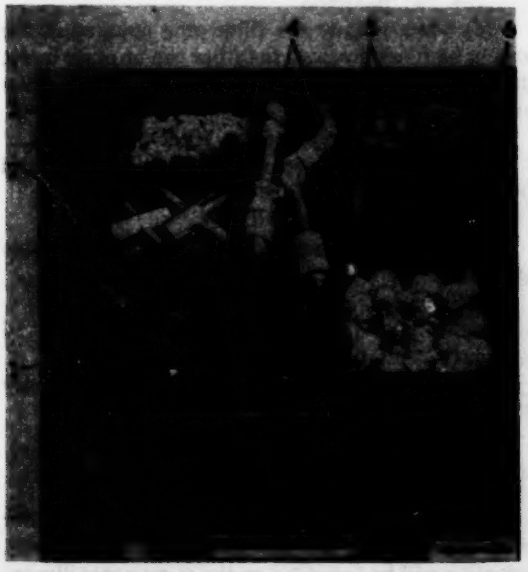
c. Close the air plunger valve (4, fig. 2-2).

d. Open the air receiver drain valve (4, fig. 2-4) to drain moisture from the compressor air receiver.

Section II. OPERATION OF AUXILIARY EQUIPMENT

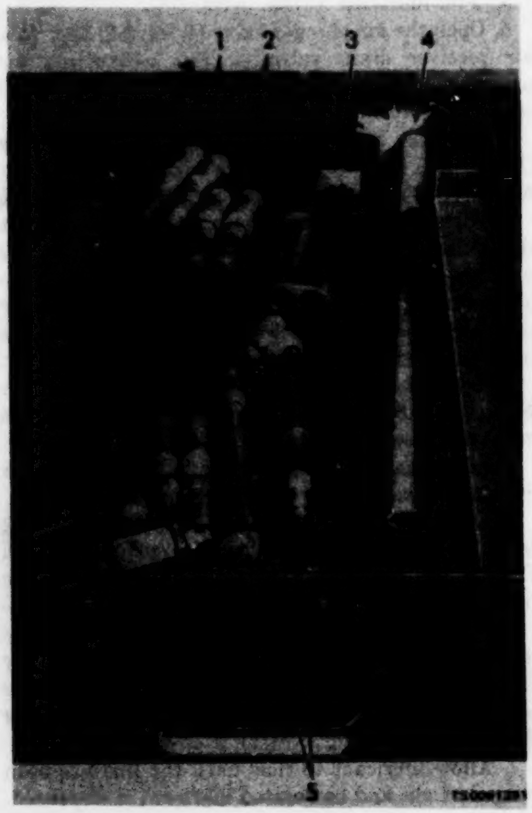
2-10. Handguns

a. General. Handguns, adapters, and couplers (figs. 2-8, 2-9, and 2-10) are located in the equipment drawers below the hose reels. These handguns are provided to help you to dispense small quantities of grease, to dispense lubricants other than general purpose grease, and to empty and fill transmissions.



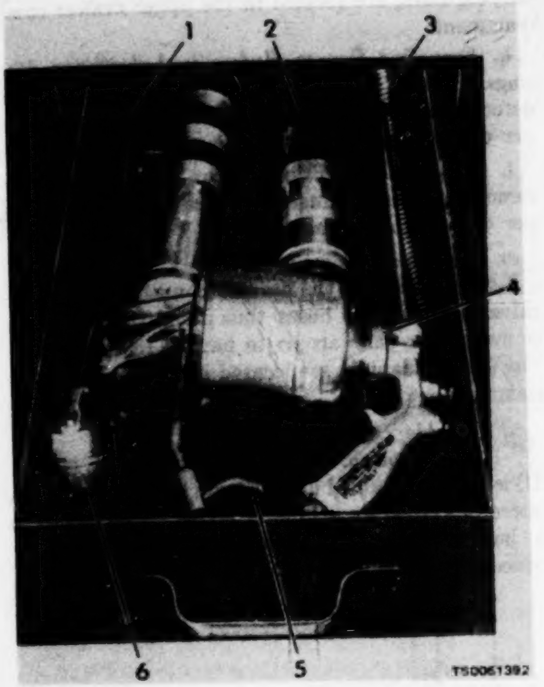
1. Pneumatic gun
2. Easy-out tool
3. Lubrication fittings
4. Extension swivel adapter
5. Air hose fittings
6. Button-head fittings

Figure 2-8. Equipment drawer compartment showing contents.



1. Flexible extension adapter
2. Flexible extension adapter
3. Air chuck and gage
4. Lubricant drum opener
5. Air chuck

Figure 2-9. Upper equipment drawer showing contents.



1. Grease gun assembly
2. Suction gun assembly
3. Flexible nozzle
4. Air-operated spray gun
5. Hacksaw
6. Pump feed oiler

Figure 2-10. Lower equipment drawer showing contents.

b. Hand Lever Grease Gun. Use the high-pressure hand lever gun (1, fig. 2-10) for dispensing lubricants in small quantities, or for dispensing special lubricants. When you operate the hand lever gun, you will get best results by taking full strokes with the lever handle. If you are using a heavy lubricant, it may be necessary to prime the lever gun occasionally. Special couplers and adapters provide adaption to all types of fittings. To fill the lever gun, proceed as follows:

(1) Unscrew head and lever from cylinder.

(2) Engage follower and push into a full stop.

(3) Place open end of the cylinder into lubricant approximately 2 inches.

(4) If barrel is not completely full, pack tightly by hand to eliminate air pockets.

(5) Replace head and lever assembly.

c. Suction Gun. You can use the suction gun (2, fig. 2-10) to empty or fill transmissions, differentials, or any part of a vehicle that requires emptying, other than by draining through a bottom outlet. Fill the suction gun by inserting the nozzle into the oil or fluid. Pull out the handle as far as it will go. When you use the suction gun for filling purposes, it is operated by inserting the nozzle into the oil hole. Push the handle forward until a sufficient quantity of oil has been delivered. When you use the suction gun for draining purposes, it is operated by inserting the nozzle into the drain hole of the housing. Pull out the suction gun handle as far as it will go, and a gun full of fluid can be removed. To empty, you must remove the nozzle from the drain hole and push in the handle as far as it will go.

d. Pump Feed Oiler. Operate the pump feed oiler (6, fig. 2-10) by squeezing the trigger. You can use it for applying small quantities of oil to friction points.

2-11. Oil Spray Gun

a. General. Use the air-operated oil spray gun (4, fig. 2-10) to obtain oil spray at high pressures. The gun consists of an oil spray container and a head with an air valve. Separate controls and adjust both the input quantity of air and the quantity of air ejected. An adjustable nozzle permits either a steady stream, or spray type oil ejection.

b. Operation. Fill the container with the desired grade of oil. Screw the container into the head. Attach the air line coupler of the spray gun to the air hose quick-disconnect coupler (5, fig. 2-4) on the lubricating unit. Turn the adjustable nozzle to the closed position. Press the air valve button and open the nozzle until desired amount of oil ejection is obtained.

2-12. Pneumatic Gun

The pneumatic gun (1, fig. 2-8) may be attached to the air hose quick-disconnect coupler (5, fig. 2-4) on the lubricating unit to permit cleaning with air pressure.

2-13. Accessory Equipment

a. Air Chuck and Gage. An air chuck and gage with quick-operating air line coupling nipple, used for inflating tires, is located in the upper drawer compartment.

b. Hacksaw Frame and Blade. The hacksaw frame and blade, for use in cutting hose when replacing reusable hose and fittings, are located in the lower drawer.

c. Padlock. Two padlocks, with two keys per lock, are used for locking the tool box and both repair drawers.

d. Quick-Disconnect Air Line Couplings. One female and three male quick-disconnect air line couplings, to replace coupling when necessary, are located in the accessory drawer.

e. High Pressure Hose End Fittings. Six female swivel and six male lube hose repair couplings are located in the upper accessory drawer compartment.

f. Air Hose End Fittings. Three each male and female reusable hose end fittings of 1/4-inch inside diameter air hoses are located in the upper drawer compartment.

g. Giant Buttonhead Hose Assembly (flexible extension adapter). Two giant buttonhead whip-end hoses, each with a 500 psi pressure relief valve, and equipped with giant buttonhead fittings, are part of the auxiliary equipment on the lubricating unit and are stored in the upper drawer compartment.

h. Buttonhead Fittings. Nine standard and nine giant buttonhead fittings, to be used as replacement parts, are located in the upper drawer compartment.

i. Extension Hydraulic Pressure Relief Adapter. One extension hydraulic pressure relief adapter with 500 psi pressure relief valve, and one rigid extension without a valve are furnished on the lubricating unit. The adapter with a relief valve is used for greasing seal-type lubrication points, to prevent rupturing seals when using power lubricating equipment. A sliding sleeve locks firmly on the coupler of the hydraulic adapter.

j. Straight Hydraulic Fittings. Six straight hydraulic fittings, to replace defective fittings of varying sizes, are located in the upper drawer co
partment.

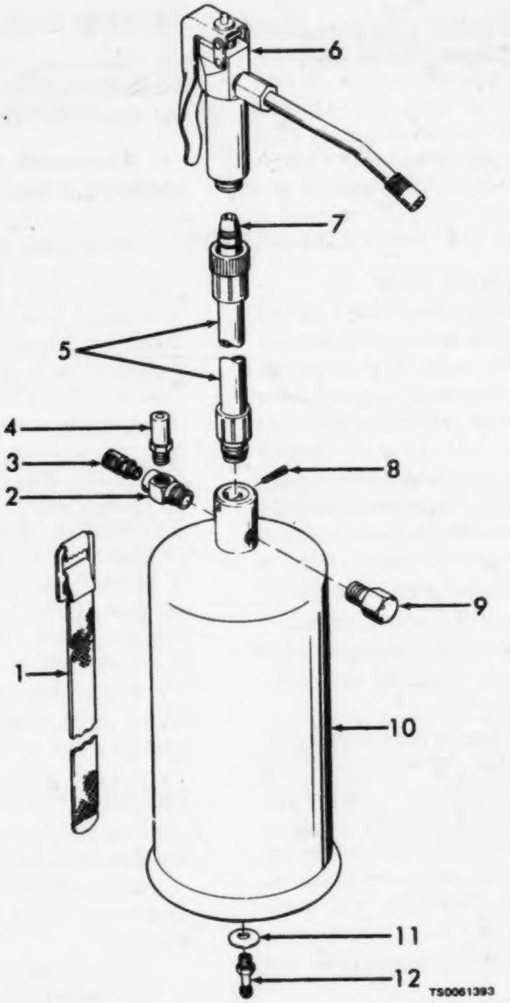
*k. Forty-five Degree Hydraulic Lubrication F
tings.* Twelve 45° hydraulic fittings, to repla
defective fittings if necessary, are located in the u
per drawer compartment.

l. Easy-Out Tool. Two easy-out tools are used f
removing grease fittings. They are located in the u
per drawer compartment.

m. Straight and Z-Swivel Adapters. A straight an
a Z-swivel adapter are used to connect the contro
valves to the supply hoses, thus permitting the valv
to swivel for easy access to hard-to-reach fitting
The swivel adapters are located in the upper drawe
compartment.

n. Portable Lubricator.

(1) *Description.* The portable lubricator (fig. 2
11) is a self-contained unit and can be strapped to th
operator's back. An air power piston forces grease t
a booster valve, where pressure is built up by
squeezing the valve handle.



1. Strap
2. Adapter
3. Fitting
4. Valve
5. Hose assembly
6. Gun assembly
7. Fitting assembly
8. Pin
9. Valve
10. Container assembly
11. Plate
12. Valve stem

Figure 2-11. Portable lubricator.

(2) *Operation.*

(*a*) With the lubricator empty of grease, remove the valve cap from the valve stem (12) located on the bottom of the tank. Charge the tank to 40 psi of air pressure.

(*b*) Remove pin (8) and insert hose assembly (5) into connector as far as it will go. Replace pin (8) to its full length and check to be sure hose assembly (5) fits tightly in connector.

(*c*) Fill the lubricator with grease until the indicator valve (4) indicates that the lubricator is full. Do not overfill.

(*d*) Insert other end of hose (5) into the body of the booster valve and screw the swivel fitting assembly (7) hand tight.

(*e*) Open the air relief valve on the booster valve until grease flows in a steady stream. Close the relief valve. The unit is now ready for use.

NOTE

The portable lubricator need not be refilled with air each time grease is completely expelled. The air charge will last about a year.

2-14. Fire Extinguisher

a. Description. The portable carbon dioxide type fire extinguisher is suitable for electrical and flammable liquid fires.

b. Operation. Remove fire extinguisher from its location; break the seal, operate the control valve, and direct the stream at the base of the flame.

c. Maintenance. For maintenance of the fire extinguisher, refer to TM 5-687.

Section III. OPERATION UNDER UNUSUAL CONDITIONS

2-15. Operation in Extreme Cold.

a. General. You will have to take special precautions when operating the lubricating and servicing unit in extremely cold temperatures. Lubrication, fuel, oil, electrical and compressed air systems, and care of lubricants are all affected by cold weather operation.

b. Care of Lubricants. Keep lubricants in tightly closed containers and, if possible, in a protected place to insure ease of handling. You must remove all snow and ice from the containers before opening them to transfer lubricants to lubricant tanks or to guns.

c. Lubrication. During the cold weather, lubricants that are too heavy will make your vehicle hard to start and difficult to operate. This will also cause rapid wear of the moving parts.

d. Electrical System. The large surges of electrical current required to start a cold engine demand good electrical contacts. Inspect, clean, and tighten all connections, especially battery terminals.

e. Fuel System. In cold weather, condensation of moisture in the air will cause water to accumulate on tools, in drums and containers. This water will freeze and form ice crystals, which clog fuel lines and carburetor jets unless the following precautions are taken.

(1) Use filter paper or other approved strainer when you fill the fuel tank or when you transfer fuel from one container to another.

(2) Remove snow or ice from the fuel tank filler cap and dispensing equipment before you fill the fuel tank.

(3) Keep the filler cap tightened properly to keep moisture and dirt from the tank.

(4) After filling or moving a fuel container, allow the fuel to settle before you fill the tank.

(5) If possible, keep the fuel tank full when you operate the unit in extremely cold weather. This will prevent condensation of moisture inside the tank.

f. Compressed Air System. Drain accumulated moisture from the compressed air reservoir as often as necessary. The air reservoir is equipped with an air receiver drain valve (4, fig. 2-4). When you open the air receiver drain valve, the water which has collected at the bottom of the tank will be ejected.

g. Batteries. The batteries installed in the lubricating unit will give satisfactory service in extreme low temperatures if you take care of them and keep them fully charged. If the lubricating unit is to remain idle for any long length of time during the cold weather, disconnect the batteries and store them in a warm place.

h. Cold Engine Starting. Before attempting to start in subzero weather, make certain the consistency of the crankcase oil is such that the engine can be started. Check the controls to make sure they are free and in operating condition. When the engine starts, leave the choke partly open until the engine is warmed to operating temperature, but be careful not to flood the carburetor.

i. Valves. Be extremely careful in operating all valves as they can be easily damaged in low temperatures.

j. Exhaust Heat Diverter. The two engine exhaust diverters (1, fig. 2-5) duct gas either to a heat reservoir beneath the lubricant container or directly to atmosphere. Use as follows:

(1) In cold weather, operate the engine exhaust diverters (1, fig. 2-5) to duct exhaust gas to the heat reservoir.

(2) Start the engine (para 2-3) and close all doors on the lubricating unit.

(3) Allow the engine to run for about 10 minutes with the air receiver drain valve (4, fig. 2-4) open.

(4) Close the air receiver drain valve; wait until the compressor unloads before using the lubricant pump.

(5) Maintain control of lubricant temperature by opening and closing the engine exhaust diverters as required.

k. Alcohol Dispenser. Use the alcohol dispenser when temperature is below 32°F (0°C). The dispenser is used to inject alcohol into the air line leading to the pump to prevent condensate freezeup. The alcohol dispenser is equipped with an 8-ounce capacity metal bowl and a needle valve which controls the flow of alcohol. Operate as follows:

(1) Shut down the unit (para 2-9).

(2) Remove plug handle (3, fig. 2-2) and fill with alcohol. Reinstall handle.

(3) Start engine (para 2-3).

(4) Open needle valve (1) approximately one-quarter turn.

(5) During operation, inspect sight gage, (2, fig. 2-2) frequently and refill when necessary.

2-16. Operation in Extreme Heat.

When operating in extremely high temperature, efficient cooling and adequate lubrication of the engine and air compressor is vitally important. The cooling system must be checked frequently to make sure the air circulation is not impaired. Give special attention to the engine shrouds and fins for cleanliness. Inspect the carburetor air cleaner frequently. Lubricate more frequently than specified in LO 5-4930-218-12.

2-17. Operation in Dusty or Sandy Areas.

Operation of the lubricating and servicing unit in sandy or dusty areas will require more frequent inspections and lubrication of the unit. Fine sand can penetrate into bushings and bearings. Remove accumulations of sand and dirt at frequent intervals. Inspect the engine and compressor shroud and fins for clogging or impairment of air circulation. Check the fuel system and take all necessary precautions to prevent sand from entering the fuel tank. During shutdown periods, fasten all housing doors securely.

2-18. Operation under Rainy or Humid Conditions.

Operation of the lubricating and servicing unit under rainy or humid conditions requires that special attention be given exposed machined parts. A thin coat of oil should be applied to all exposed machined parts to keep them as free of moisture as possible. High moisture content in the air may cause difficulty in the electrical system. The spark plug, magneto, and wiring can become unserviceable due to high humidity. Clean and dry affected parts at frequent intervals.

2-19. Operation in Salt Water Areas.

In salt water areas, give special attention to general maintenance of the lubricating and servicing units to prevent corrosion of these metal parts. Keep a thin coat of oil on all exposed machined parts, and keep as clean and free of moisture as possible. Make sure all unpainted spots are painted or coated with approved preventive compounds. When equipment has been exposed to salt water, steam clean or wash exposed areas with clean, fresh water as soon as possible; dry thoroughly.

2-20. Operation in High Altitudes.

The air pressure above sea level decreases as altitude is increased. The result is a decrease in air pressure to the carburetor causing a too rich gasoline air mixture. If this condition interferes with the operation of the unit, adjust the carburetor in accordance with instructions provided in TM 5-2805-203-14.

CHAPTER 3
OPERATOR'S MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3-1. General

This section contains supplemental information and lubrication instructions that the operator must perform on the lubricating and servicing unit. Lubrication Order LO 5-4930-218-12 will indicate to you the required lubrication points, intervals, and detailed instructions for the lubricating and servicing unit. TM 5-2805-203-14 covers engine lubrication requirements.

3-2. Detailed Lubrication Information

a. Keep all lubricants in closed containers and store in a clean, dry place away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricants. Keep all lubrication equipment clean and ready to use.

b. Keep all external parts not requiring lubrication free of lubricants. Before lubricating the equipment, wipe all lubrication points free of dirt and grease. Clean all lubrication points after you lubricate them to prevent accumulation of dirt.

c. You must take the following precautions when using a subzero engine oil in the compressor crankcase:

(1) The crankcase oil level must be checked frequently, as oil consumption may increase.

(2) The oil may require changing more frequently than usual because contamination by fuel dilution and sludge formation will increase under cold weather operation conditions.

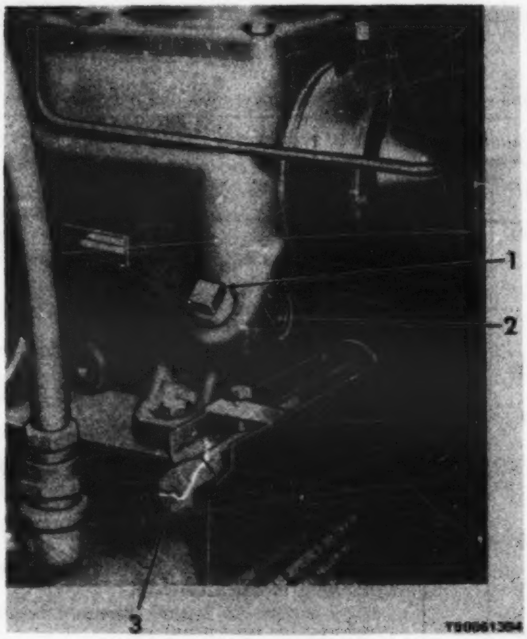
d. Service the air cleaner (see TM 5-2805-203-14).

3-3. Compressor Lubrication

Compressor crankcase lubrication consists primarily of changing the oil in the crankcase. Proceed as follows:

a. Run the compressor long enough to heat it to operating temperature. This is important since warm oil will drain from the internal compressor parts much more rapidly than cold oil. The warm oil will also carry more dirt and sludge with it as it drains.

b. Place suitable containers under the compressor drain port before you remove the compressor oil drain cap (3, fig. 3-1). Allow the oil to drain fully.



1. Oil filler plug
2. Oil level sight gage
3. Oil drain cap

Figure 3-1. Air compressor lubrication.

c. Install the drain cap on the drain pipe.

d. Remove the oil filler plug (1, fig. 3-1) from the compressor crankcase and pour 2 quarts of engine oil into the compressor. You must use the oil required for the particular temperature range which will be encountered. Refer to LO 5-4930-218-12.

e. Check the oil level on the oil level sight gage (2, fig. 3-1). It must be up to the full mark. If oil level is low, add enough oil through the oil filler plug opening to bring the oil up to the proper level. Take care not to overfill.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-4. General

To insure that the lubricating and servicing unit is ready for operation at all times, you must inspect it systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services to be performed by you are listed in table 3-1. The sequence numbers indicate the order in which you should perform the preventive maintenance checks and services. Defects discovered during operation of the unit shall be noted for correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noted during operation which would damage the equipment if operation were continued. You shall record all deficiencies and shortcomings together with th corrective action taken on DA Form 2404 (Equipmen Inspection and Maintenance Worksheet). Correct al deficiencies at the earliest possible opportunity.

3-5. Preventive Maintenance Checks an Services

Refer to table 3-1 for a listing of operator/crev preventive maintenance checks and services.

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services

D — Daily W — Weekly

Interval and Sequence No.		ITEM TO BE INSPECTED PROCEDURE
D	W	
(1)		ENGINE OIL Before operation, check oil level in engine crankcase. Add oil if necessary (TM 5-2805-203-14).
		ENGINE OIL Before operation, check oil level in engine crankcase. Add oil if necessary (TM 5-2805-203-14).
2		ENGINE AIR CLEANER Service air cleaner if necessary (TM 5-2805-203-14).
3		FUEL SYSTEM **WARNING** **Do not fill fuel tank while engine is running.** Fill tank if necessary. Check for secure mountings. Check for fuel leaks (para 3-9*c*).
4		COMPRESSOR OIL Before operation, check oil level in compressor crankcase. Add oil if necessary (LO 5-4930-218-12).
5		COMPRESSOR AIR CLEANER Check element for clogging. Service if necessary (para 3-11*c*).
6		COMPRESSOR DRIVE BELTS Check belt tension. Belts must deflect 3/4 inch with thumb pressure applied at midpoint between drive sheaves. Adjust if necessary (para 3-11*b*).
7		ALTERNATOR DRIVE BELT Check drive belt for improper tension and for wear and damage. Report defective belt to organizational maintenance.
8		INSTRUMENT PANEL Check for broken gage glass and defective switch operation. Report defects to organizational maintenance.
9		BATTERIES **WARNING** **Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen gas, which is highly explosive.** Check fluid level. If low, fill to the proper level with distilled water (para 3-10*a*).
10		TIRES Check for 50 psi inflation pressure. Inspect for cuts, breaks, blisters, and flat spots. Inspect valve stems for leaks. Service if necessary.
11		BRAKE SYSTEM AIR RESERVOIR Check for condensation in reservoir. Drain daily (para 3-13*a*).
	12	MASTER BRAKE CYLINDER Check fluid level in cylinder. Service if necessary (para 3-13*b*).
	13	SPRINGS AND SHOCK ABSORBERS Check for broken leaves in springs and for leaking shock absorbers.

Section III. TROUBLESHOOTING

3-6. General

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the lubricating and servicing unit. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. Perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If you experience a malfunction which is not listed or is not corrected by listed corrective actions, notify your supervisor.

3-7. Operator/Crew Maintenance Troubleshooting

Refer to table 3-2 for troubleshooting which is allocated to operator/crew maintenance levels.

NOTE

Before you use this table, be sure you have performed all applicable operating checks.

Table 3-2. Operator/Crew Troubleshooting

MALFUNCTION
    TEST OR INSPECTION
        CORRECTIVE ACTION

ENGINE

1. ENGINE FAILS TO TURN OVER WHEN STARTING BUTTON IS DEPRESSED.

Step 1. Check to see if electrolyte level in battery cells is above the top of the plates.

WARNING

Do not smoke or use an open flame in the vicinity when servicing the battery. Batteries generate hydrogen gas, which is highly explosive.

If electrolyte level is below top of plates, add distilled water until electrolyte level is 1/2 inch above separators.

Step 2. Inspect for loose, corroded, or broken battery cables.

Clean corroded cables. Tighten loose connections at battery, ground, and starter. If cables are broken, notify organizational maintenance.

2. ENGINE TURNS OVER BUT FAILS TO START.

Step 1. Check to be sure oil pressure bypass switch was firmly pressed.

Attempt to start engine, pressing switch firmly.

Step 2. Check for insufficiently choked carburetor, especially when engine is cold.

Pull out choke.

Step 3. Check for empty fuel tank.

WARNING

Do not fill fuel tank while engine is running.

Refill empty fuel tank.

Step 4. Check for water or dirt in fuel filter bowl.

Drain fuel tank and lines (para 3-9*b*). Refill with fresh fuel.

Step 5. Check for flooded carburetor, especially if engine is hot.

Turn over engine with choke open (choke control handle pushed in) and throttle open (throttle control handle pulled out).

3. ENGINE STARTS BUT THEN STOPS.

Step 1. Check that oil pressure bypass switch is held long enough to insure starting.

Hold switch until oil pressure exceeds 20 psi.

Step 2. Check for insufficient fuel supply.

Refill empty fuel tank.

Step 3. Check fuel filter bowl for contaminated fuel.

Drain fuel tank and lines (para 3-9*b*). Refill with fresh fuel.

Step 4. Check for pulled out choke.

Push in choke control as engine warms.

Step 5. Check for tripped oil pressure safety switch.

If switch has been tripped, check oil level. If low, fill to proper level with recommended oil (TM 5-2805-203-14). If oil level is not low, report trouble to organizational maintenance.

4. ENGINE RUNS BUT CONTINUALLY MISFIRES.

Step 1. Check for water in fuel.

Drain fuel tank and lines (para 3-9*b*). Refill with fresh fuel.

Step 2. Check for clogged fuel strainer.

Service fuel strainer (para 3-9*a*). Replace strainer element.

Table 3-2. Operator/Crew Troubleshooting — Continued

MALFUNCTION
- TEST OR INSPECTION
  - CORRECTIVE ACTION

- 5. ENGINE OVERHEATS.
  - Step 1. Check oil level.
    - If oil level is low, fill to the proper level with recommended oil (TM 5-2805-203-14).
  - Step 2. Check that all air shrouding is unclogged, in place, and undamaged.
    - Remove foreign matter from air shrouding. Tighten loose shrouding. Notify organizational maintenance of other d
- 6. ENGINE RUNS BUT LACKS POWER.
  - Step 1. Check that throttle control is in full speed position.
    - If throttle control is not in full speed position, pull out throttle control to provide full speed operation.
  - Step 2. Check that choke is fully open when engine is warm.
    - Push in choke control.

AIR COMPRESSOR

- 1. COMPRESSOR OVERHEATS
  - Step 1. Check for dirty cooling fins on intercooler, aftercooler, and cylinder.
    - Clean cooling fins.
  - Step 2. Check for slipping drive belt.
    - Tighten drive belt to required tension (para 3-11*b*).
  - Step 3. Check for dirty compressor air cleaner.
    - Service air cleaner (para 3-11*c*).
  - Step 4. Check compressor oil level.
    - Add oil to crankcase (para 3-3).
- 2. COMPRESSOR PUMPS TOO SLOWLY
  - Step 1. Check for loose drive belt.
    - Tighten drive belt (para 3-11*b*).
  - Step 2. Check for dirty air cleaner.
    - Service air cleaner (para 3-11*c*).
  - Step 3. Check for air system leakage using soap bubble solution.
    - Report leaks to organizational maintenance.
  - Step 4. Check for low compressor oil level.
    - Add oil to crankcase if low (para 3-3).
- 3. DRIVE BELT WEARS EXCESSIVELY
  - Step 1. Check if drive belt is too loose or too tight.
    - Correct drive belt tension (para 3-11*b*).
  - Step 2. Check for oil or grease on V-belt.
    - Clean oil or grease from drive belt.

DISPENSING SYSTEM

- 1. ALL DISPENSERS FAIL TO DELIVER LUBRICANT AT NORMAL RATE
  - Step 1. Check that air pressure gage indicates pressure of 150 to 175 psi.
    - Run compressor to get full pressure buildup.
  - Step 2. Check that air plunger valve (4, fig. 2-2) and air receiver shutoff valve (2, fig. 2-5) are open.
    - Open valves.
  - Step 3. Check for stiff lubricant due to cold temperatures.
    - Use exhaust diverter valve (1, fig. 2-5) to heat lubricant tank before dispensing lubricant.
- 2. ONE DISPENSER FAILS TO DELIVER LUBRICANT AT NORMAL RATE
  - Step 1. Check dispensing pump air pressure regulator for proper adjustment.
    - Increase air pressure to lubricant pump if required.
  - Step 2. Check air line to pump for kinks or restrictions.
    - Correct kinks or restrictions.
  - Step 3. Check lubricant dispensing lines for kinks or restrictions.
    - Correct kinks or restrictions.
  - Step 4. Check for frozen air regulator due to cold temperatures.
    - Use alcohol dispenser to prevent freezeup in cold weather.

Section IV. MAINTENANCE PROCEDURES

3-8. Maintenance of Engine

Refer to TM 5-2805-203-14 for operator/crew maintenance of the Military Standard engine used on this equipment. Refer to the Maintenance Allocation Chart in Appendix B of this publication.

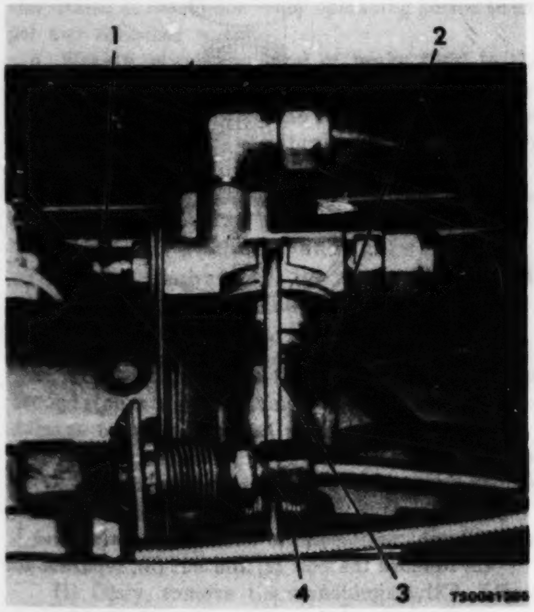
3-9. Maintenance of Fuel System

Normal operation of the engine requires no maintenance of the fuel tank, lines, and fittings other than that which is obvious such as filling tank with fuel and tightening loose fittings. If engine operation becomes faulty or erratic, you may need to do the following:

WARNING

Clean all parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of the skin to cleaning solvent. Wash exposed skin thoroughly.

a. Check fuel strainer bowl (2, fig. 3-2) for moisture or contamination. If necessary, close the shutoff valve (1), loosen the bail nut (4), and swing aside the bail (3) to remove the bowl. Empty and clean the bowl. Replace the bowl and open the shutoff valve.



1. Fuel shutoff valve
2. Fuel bowl
3. Bail
4. Bail nut

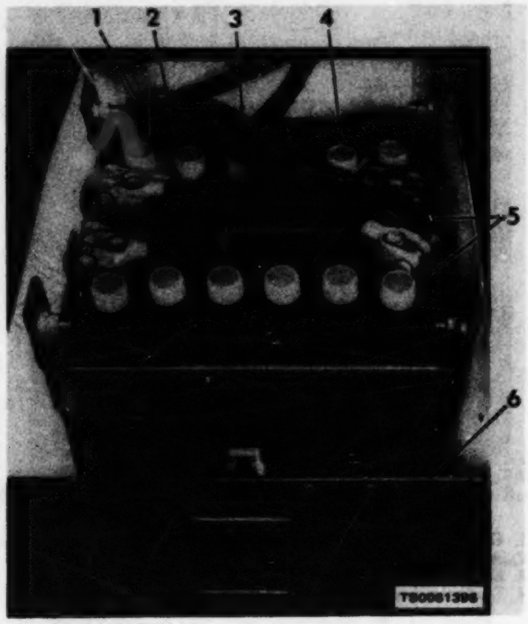
Figure 3-2. Fuel Strainer.

b. Drain and clean fuel tank. To drain contaminated fuel from tank, open the drain valve and drain fuel into suitable container. Flush out contaminated fuel tank and fuel lines with solvent (fed. spec. P-D-680).

c. Inspect the fuel tank and lines for leaks, cracks, dents, damaged threads, and broken weldments. Report any damage to organizational maintenance.

3-10. Maintenance of Engine Electrical System

a. To help insure easy engine starting, you must check and service the batteries (5, fig. 3-3) frequently. Keep batteries filled to the required level with distilled water. Keep the top of the batteries and the battery terminals clean. To protect the terminals from corrosion, you can coat them with a light application of GAA lubricant.



1. Connector cable
2. Ground cable (-)
3. Battery cable (+)
4. Cap
5. Battery
6. Battery drawer

Figure 3-3. Battery mounting and connections.

b. To help maintain the required battery charging rate, check generator drive belt tension to insure that there is no slippage. If generator drive belt is loose or damaged, refer to organizational maintenance.

3-11. Maintenance of Compressor

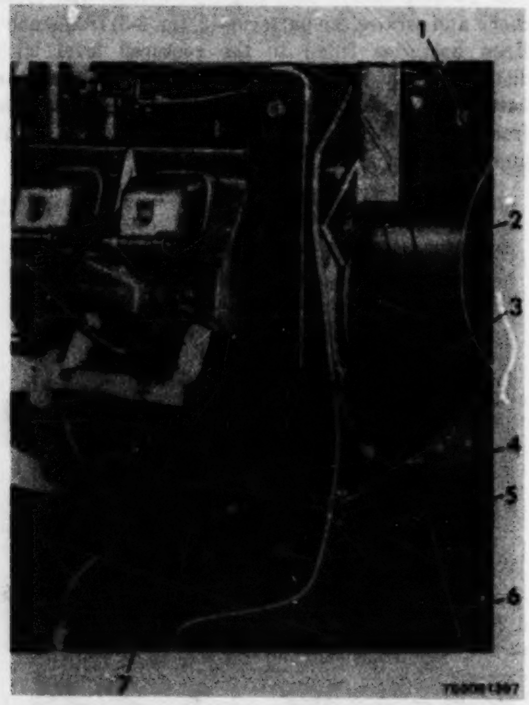
Operator/crew maintenance of the compressor consists of the following:

a. Oil Change: Change compressor oil. Refer to paragraph 3-3.

b. Compressor Drive Belt Check and Adjustment.

(1) With the engine stopped, check engine-to-compressor drive belt tension. When the drive belts are properly adjusted, you should be able to deflect them one-half to three-fourths inch using thumb pressure at midpoint of the belt.

(2) To adjust belt tension, loosen the cap screw (1, fig. 3-4) that secures the belt guard (2) to the engine. Loosen the four bolts (4) that secure the engine mounting base to the air receiver (6).



1. Cap screw
2. Belt guard
3. Engine
4. Engine mounting bolt
5. Engine mounting base
6. Air receiver
7. Adjusting bolt

Figure 3-4. Air compressor drive belt tension adjustment.

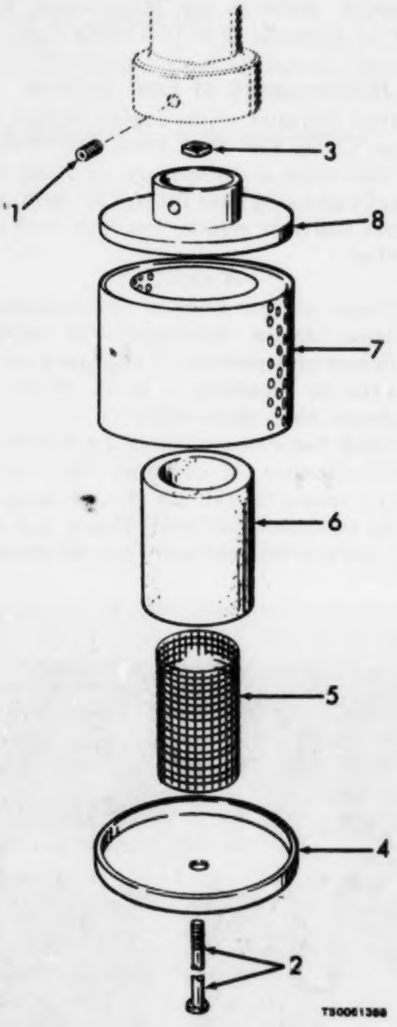
(3) Turn the engine position adjusting bolt (7) clockwise to tighten the drive belts or counterclockwise to loosen the belts. Make sure belt pulleys are aligned and that shafts are perpendicular to belts when you finish adjusting the tension.

(4) After proper adjustment is made, tighten the engine base mounting bolts (4) and tighten the belt guard cap screw (1).

(5) If belts are frayed, worn, oil saturated, cracked, or show signs of overheating, refer to organizational maintenance.

c. Air Compressor Air Cleaner Service. Weekly, or more frequently when you operate the lubricating and servicing unit under conditions of extreme dust and dirt, service the air compressor air cleaner a follows:

(1) Remove the setscrew (1, fig. 3-5) and remov the air cleaner assembly from the air inlet elbow or the compressor.



1. Setscrew
2. Bolt
3. Nut
4. Bottom cover
5. Screen
6. Element
7. Body
8. Top cover

Figure 3-5. Air compressor air cleaner, exploded view.

(2) Remove the bolt (2) and nut (3); separate the parts of the air cleaner.

(3) Wash the element (6) in soapy water. Squeeze and shake dry.

(4) Wash all metallic parts in dry cleaning solvent (fed. spec. P-D-680). Dry thoroughly.

(5) Inspect the element for clogging, holes, deterioration, and other damage; replace if

necessary.

(6) Inspect all other parts for cracks, distortion, and damage. Replace defective parts.

(7) Reassemble and install parts as shown in figure 3-5.

d. Air Receiver. Check that air receiver is drained each time the compressor is shut down. Do not allow moisture to collect in the air receiver. Drain the air receiver by opening the air receiver drain valve (4, fig. 2-4).

3-12. Maintenance of Lubricant Dispensing System

a. Keep the lubricant dispensing system parts clean and free from spilled lubricants. Wipe dispensing equipment and hoses before stowing after use. Clean spilled lubricants from the trailer and other parts.

b. Inspect the dispensing hoses and nozzles for damage. Report any damage you find to organizational maintenance.

c. Before dispensing lubricants, be sure to open the condensate valves (5, fig. 2-2) to drain any collected moisture from the lubricant pumps.

3-13. Maintenance of Trailer

a. Be sure that you keep all moisture drained from the trailer brake system air reservoir. Open the reservoir drains at least once every operating period to expel any collected water.

b. Weekly, check the level of brake fluid in the master brake cylinder. To assure safe brake operation, you must keep the reservoir full. Remove the filler plug and fill with brake fluid as directed in LO 5-4930-218-12.

c. Daily, check tires for proper inflation. You must maintain an air pressure of 50 psi. Use the tire chuck and gage provided with the lubricating and dispensing unit to check tire pressure before towing the trailer.

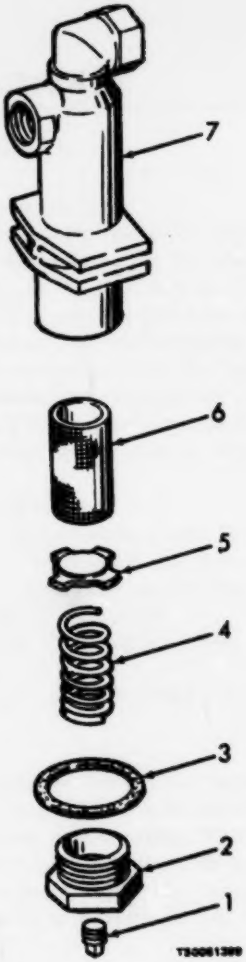
d. Weekly, check tires for wear, cracks, cuts, imbedded stones or penetrating objects, or leaks. Report damage to organizational maintenance.

e. Weekly, check springs for broken leaves and check shock absorbers for leaks. Report any damage to organizational maintenance.

f. Service the trailer brake system air filter as follows:

(1) Daily, remove the end plug (1, fig. 3-6) to drain the collected moisture from the filter.

(2) Weekly, remove the nut (2) and fiber washer (3), and remove the spring (4), washer (5), and filter (6) from the housing (7) and wash all metallic parts with dry cleaning solvent (fed. spec. P-D-680). Shake dry the filter. Reassemble the parts as shown in figure 3-6.



1. End plug
2. Nut
3. Fiber washer
4. Spring
5. Washer
6. Filter
7. Housing

Figure 3-6. Brake air filter, exploded view.

3-14. Maintenance of Trailer Lighting System

Before you tow the lubricating and dispensing unit in traffic, check that the lighting system is operating properly when the unit is connected to the towing vehicle. Check that brake lights, directional signals, tail lights, and running lights are all functioning. Report malfunction to organizational maintenance.

CHAPTER 4
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF MATERIEL

1. Inspecting and Servicing the Equip- ent

a. Before you install the lubricating and servicing it, inspect the equipment as follows:

(1) Inspect for cracks, dents, and other damage at may have occurred during shipment.

(2) Inspect for loose or missing hardware. ghten all loose hardware.

(3) Check the engine and air compressor for aking.

(4) Inspect the hoses and hose reels for damage. oses must pull easily from reels. Check all dispen- rs for cracks and damage.

(5) Remove the tape from all engine and com- essor openings that have been sealed.

(6) Using the starter switch with the ignition itch to OFF, jog the engine. The engine and com- essor shall turn freely without binding or scraping other signs of faulty operation.

(7) Inspect the control panel (fig. 2-1) for maged controls and instruments.

(8) Open the drawers and check that all auxiliary uipment is present and in good condition.

(9) Remove any paper from between drive belts d the engine and compressor pulleys. Adjust belt nsion (para 3-11*b*). .

(10) Report any damage to your supervisor.

b. Servicing the lubricating and servicing unit consists of the following procedures:

(1) If you are preparing the unit for initial use, open the container of electrolyte and fill the dry charge batteries so that the electrolyte is up to the required level. If possible, charge the batteries for 10 or 15 minutes before connecting and applying the starting load. Refer to paragraph 4-23 for battery charging instructions. Make sure you have securely connected the batteries. Note that the positive lead is marked +. The electrical system has a negative ground.

WARNING

Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen gas, which is highly explosive.

(2) Fill the fuel tank with gasoline. Fuel tank capacity is 10 gallons.

(3) Lubricate the unit per LO 5-4930-218-12.

4-2. Installation

This equipment is designed for mobile operation and not for permanent installation. After servicing, no installation procedures are required. The unit transports lubricants to the equipment which is to be serviced. Loading lubricants into the lubricant dispenser tanks is covered in paragraph 2-6.

Section II. MOVEMENT TO A NEW WORKSITE

3. Dismantling for Movement

a. Open the air receiver drain valve (4, fig. 2-4) to ease air from the air receiver.

b. Apply the hose reel locks (6) to lock the hose ls, preventing hoses from unwinding. Make sure h dispenser (1, 2, and 3) is mounted in its bracket.

c. Close and latch lubricant tank covers.

d. Make sure all drawers are latched and locked.

e. Close and secure all enclosure doors.

f. Tow the unit to the new worksite. Proceed as lows:

(1) Attach a suitable towing vehicle to the ller; connect the trailer air brakes, safety chains, l electrical systems. Check condition of systems proper operation before movement.

(2) Retract the landing gear. Secure in the travel tion. Remove the wheel chocks and stow on fen- mounting bracket. Remove the safety stands (5, 1-2) from under the frame and stow them behind fenders. Secure with the T-handled bolts.

4-4. Setup after Movement

a. Position the unit so that the back end faces the equipment to be serviced. This will facilitate your access to the dispensing equipment.

b. Remove the wheel chocks (10, fig. 1-1) from fender mounting brackets and install them under the wheels.

c. If the towing vehicle is going to be disconnected, lower the landing gear before you uncouple the lunette of the lubricating and servicing unit from the towing vehicle.

d. Position the safety stands (5, fig. 1-2) under the rear of the frame. Use the landing gear crank to raise the front of the unit so that the frame rests firmly against the safety stands. Unit should be reasonably level for operation.

e. Open the enclosure doors to provide adequate air circulation for proper cooling of the engine and compressor.

WARNING

Be sure that you do not operate the lubricating and servicing unit in an enclosed area unless the exhaust gases are piped to the outside. Inhalation of exhaust fumes will result in serious illness or death.

Section III. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

4-5. Tools and Equipment

Tools, equipment, and repair parts issued with the lubricating and servicing unit are described in paragraphs 2-10 through 2-13 under Operation of Auxiliary Equipment.

4-6. Special Tools and Equipment

No special tools or equipment is required for organizational maintenance of the lubricating servicing unit.

4-7. Maintenance Repair Parts

Repair parts and equipment are listed in repair parts and special tools list coveri organizational maintenance for this equipme Refer to TM 5-4930-218-24P.

Section IV. LUBRICATION INSTRUCTIONS

4-8. General

This section contains supplemental information and lubrication instructions that must be followed for the lubricating and servicing unit at the organizational maintenance level. Refer to LO 5-4930-218-12 for your lubrication points, intervals, and detailed instructions. Also, reference to paragraphs 3-2 and 3-3 of this manual will provide you with additional lubrication information.

4-9. Trailer Lubrication

Lubrication at organizational maintenance consists primarily of lubricating trailer wheel bearing Refer to paragraph 4-58 for wheel bearing maintenance and lubrication instructions.

Section V. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (MONTHLY AND QUARTERLY)

4-10. General

This section lists the preventive maintenance checks and services which shall be performed on a monthly or quarterly basis by organizational maintenance personnel. It includes and expands upon the preventive maintenance services performed by operator/crew maintenance and includes additional services which are allocated to organizational maintenance.

4-11. Preventive Maintenance Checks and Services

Refer to table 4-1 for a listing of the preventiv maintenance checks and services which are allocated to organizational maintenance.

Table 4-1. Organizational Preventive Maintenance Checks and Services

M—Monthly

Q—Quarterl

Interval and Sequence No.		ITEM TO BE INSPECTED
M	Q	PROCEDURE
1		ENGINE OIL Check that engine oil and filter have been changed at required interval (TM 5-2805-203-14).
2		AIR CLEANER Check condition of air cleaner element. Clean or replace element and replace any other damaged parts. Refer to TM 5-2805 203-14.
3		FUEL SYSTEM Correct any leaks and replace defective parts. Check fuel for contamination. Refer to paragraph 4-20.
4		COMPRESSOR OIL Check that compressor oil has been changed at required interval (LO 5-4930-218-12).
5		COMPRESSOR AIR CLEANER Check condition of element. Clean or replace element and replace any other damaged parts.
6		COMPRESSOR DRIVE BELTS Check belts for improper tension and for damage or wear. Replace drive belt set if damaged.

Table 4-1. Organizational Preventive Maintenance Checks and Services—Continued

M—Monthly Q—Quarterly

Interval and Sequence No. M	Q	ITEM TO BE INSPECTED PROCEDURE
7		ALTERNATOR DRIVE BELT Check drive belt for improper tension and for damage or wear. Replace drive belt if damaged.
8		INSTRUMENT PANEL Inspect for inoperative or illegible gages, defective switches, or damaged controls. Replace as required. Refer to paragraphs 4-28 through 4-31.
9		BATTERIES **WARNING** **Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen gas, which is highly explosive.** Test battery condition with a hydrometer. Replace batteries if they fail to take and maintain a charge. Refer to paragraph 4-23.
10		TIRES Inspect tires for proper inflation and condition. Repair or replace tires as necessary. Refer to paragraph 4-57.
11		BRAKE SYSTEM AIR RESERVOIR Check reservoir for dents, damage, and leaking. Check for secure mounting and fittings.
12		BRAKE MASTER CYLINDER Check for secure mounting and proper operation. Repair if leaking or defective (para 4-64).
13		SPRINGS AND SHOCK ABSORBERS Check for broken leaf springs or leaking shock absorbers. Replace if defective (para 4-69 and 4-70).

Section VI. TROUBLESHOOTING

4-12. General

a. This section contains organizational maintenance troubleshooting information for locating and correcting most of the operating troubles which may develop in the lubricating and servicing unit. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. Only those functions which are solely within the scope of organizational maintenance are listed. For troubleshooting procedures which are within the scope of operator/crew maintenance, refer to paragraph 3-7.

4-13. Organizational Maintenance Troubleshooting Chart

Refer to table 4-2 for troubleshooting which is allocated to organizational maintenance levels.

NOTE

Before you use this table, be sure you have performed all applicable operating checks.

Table 4-2. Organizational Maintenance Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ENGINE FAILS TO TURN OVER WHEN STARTING BUTTON IS DEPRESSED.

Step 1. Check for a weak or dead battery.
Charge or replace battery (para 4-23).

Step 2. Inspect for loose or broken battery cables.
Tighten or replace broken battery cables.

Step 3. Check for faulty starter pushbutton.
Replace faulty pushbutton (para 4-29).

Step 4. Check for defective starting motor.
Replace defective starting motor (para 4-24).

Step 5. Check for internal seizure of the engine or compressor.
Replace engine or compressor if seized (para 4-38 or 4-42).

Table 4-2. Organizational Maintenance Troubleshooting—Continued

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

WHEEL BRAKES FAIL TO APPLY WHILE VEHICLE IS BEING TOWED
Step 1. Check that towing vehicle applies air to trailer reservoir.
Make proper connections between towing vehicle and trailer (para 4-60c).
Step 2. Check for brake system air leaks, using soap suds.
Correct leaks, replacing parts if necessary (para 4-60).
Step 3. Check for improperly adjusted wheel brakes.
Adjust wheel brakes (para 4-65a).
Step 4. Brake master cylinder defective or out of fluid.
Service or replace brake master cylinder (para 4-64).
Step 5. Check for worn brake linings.
Replace brake shoes if linings are worn excessively (para 4-65).
Step 6. Check for leaking or defective wheel cylinders.
Replace defective wheel cylinders (para 4-65).

COMPRESSOR FAILS TO BUILD UP OR MAINTAIN REQUIRED PRESSURE
Step 1. Check drive belts for damage or slipping.
Adjust or replace drive belt as necessary (para 4-36).
Step 2. Check compressor pilot valve for proper adjustment.
Adjust pilot valve (para 4-44a).
Step 3. Check engine throttle control for failure to open throttle fully.
Adjust throttle control (para 4-30).
Step 4. Check for leak in air receiver or piping.
Correct leak or replace defective parts.
Step 5. Check for defective compressor valving.
Replace compressor (para 4-42).

ONE LUBRICANT SYSTEM FAILS TO DISPENSE LUBRICANT AT REQUIRED RATE
Step 1. Check for faulty air pressure regulator.
Repair or replace defective regulator (para 4-49).
Step 2. Check for lubricant discharge directly from pump.
Replace pump if it fails to deliver lubricant (para 4-49).
Step 3. Check for clogged hoses or piping on discharge side of pump with dispenser disconnected.
Repair, clear, or replace defective discharge piping or hose (para 4-48).
Step 4. Check operation of lubricant dispenser.
Repair or replace defective dispenser.

WHEELS FAIL TO ROTATE OR ROTATE WITH DIFFICULTY
Step 1. Check wheel bearings for inadequate lubrication or defects.
Pack or replace wheel bearings if necessary (para 4-58).
Step 2. Check wheel brakes for failure to release.
Repair brake system (Section XVIII).

Section VII. RADIO INTERFERENCE SUPPRESSION

4-14. General Methods Used to Attain Proper Suppression

a. Essentially, suppression is attained by providing a low resistance path to ground for stray currents. Methods used include shielding the ignition and high frequency wires, grounding the frame with bonding straps, and using capacitors and resistors.

b. Refer to TM 5-2805-203-14 for interference suppression of the engine.

4-15. Interference Suppression Components

a. Generator Capacitor. Test capacitor for lea and shorts on a capacitor tester; replace defecti capacitor.

b. Engine. Refer to TM 5-2805-203-14 for engi suppression components.

Section VIII. ENCLOSURE, BATTERY BOX, STORAGE COMPARTMENTS, AND FRAME

4-16. Description

a. An aluminum enclosure covers the lubricating and servicing unit to provide protection from weather and dust. Doors are provided in the enclosu to permit access to the operator controls, tool bo storage compartments, lubricant storage tanks, a dispensing reels. Lifting handles are provided to aid enclosure removal. The enclosure is mounted on a welded frame and is secured to the frame with four lifting eyes. The frame also provides a mounting for trouble light reel.

b. The battery box is mounted at the rear of the unit and provides a drawer in which the batteries are mounted, drawers for storage of accessories, and a mounting for the hose reels. The battery drawer is mounted on rollers to permit easy opening of the drawer to facilitate battery service.

c. The tool box is mounted in the middle of the skid base. The tool box and the upper storage drawer in the battery box have trays to protect the stored equipment.

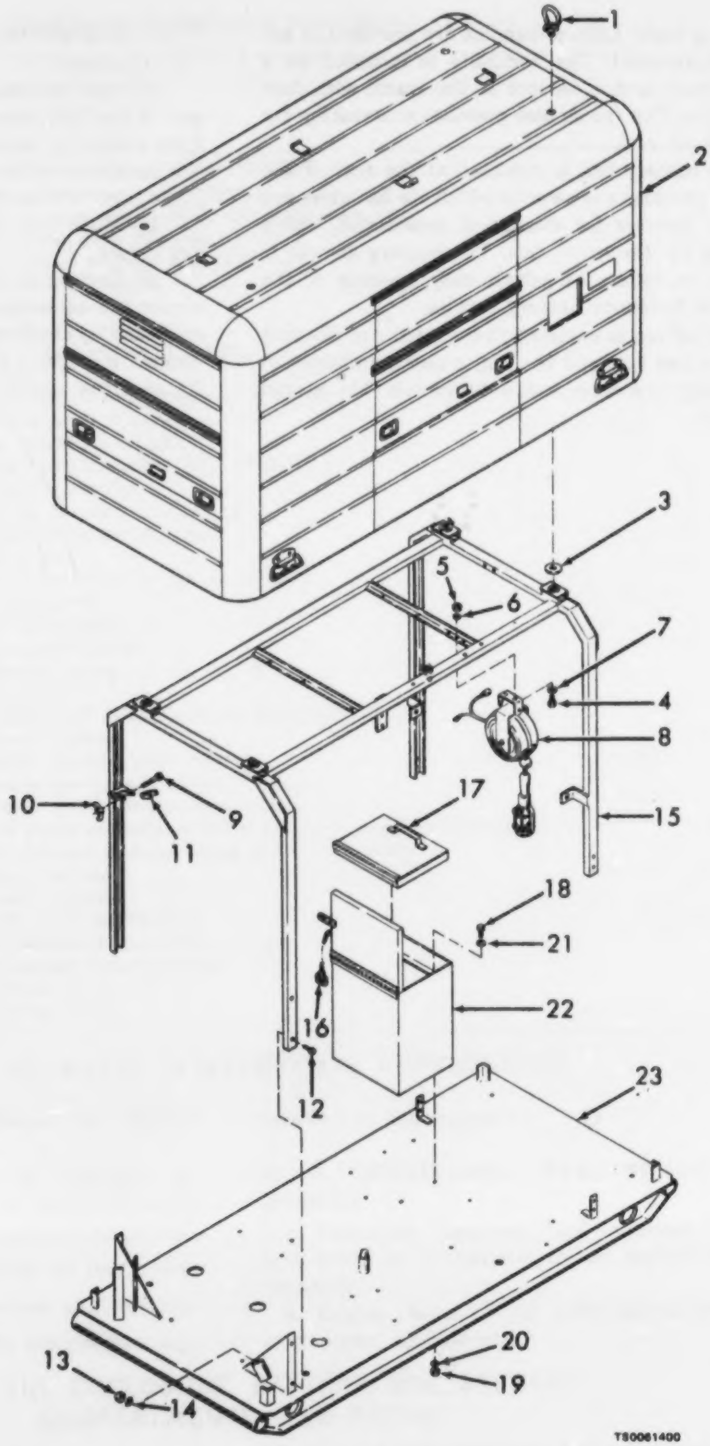
4-17. Enclosure, Frame, and Tool Box

a. Removal.

(1) Open the door of the enclosure to provide access to the fuel housing and cap assembly (3, fig. 4-3) from within the enclosure. Loosen the nut and rotate the handle to release the housing and cap assembly. Disengage it from the inside of the enclosure.

(2) Make sure all access doors of the enclosure are closed.

(3) Remove the four lifting eyes (1, fig. 4-1) that secure the enclosure (2) to the frame (15). Grasp the enclosure by the four lifting handles and raise the enclosure straight up to remove it from the frame. Remove the spacer washers (3).



1. Lifting eye
2. Enclosure
3. Spacer washer
4. Cap screw
5. Nut
6. Lock washer
7. Flat washer
8. Light reel
9. Cap screw
10. Wing nut
11. Transfer pump mounting pad
12. Cap screw
13. Nut
14. Lock washer
15. Frame
16. Lock
17. Compartment tray
18. Cap screw
19. Nut
20. Lock washer
21. Flat washer
22. Tool box
23. Skid

Figure 4-1. Enclosure, frame, and tool box, exploded view.

(4) Disconnect the electrical leads to the trouble light reel (8). Remove the two cap screws (4), nuts (5), lock washers (6), and flat washers (7) that secure the trouble light reel to the frame (15); remove the reel.

(5) Remove the wing nut (10) and cap screw (9); remove the transfer pump from the unit.

(6) Remove the eight cap screws (12), nuts (13), and lock washers (14) that secure the frame (15) to the brackets on the skid base; remove the frame by lifting it straight up.

(7) Remove the compartment tray (17) from the tool box (22). Remove the four cap screws (18), nuts (19), lock washers (20), and flat washers (21) that secure the tool box (22) to the skid base (23); remove the tool box.

b. Cleaning and Inspection.

(1) Steam clean the inside and outside of the enclosure and tool box. Remove any greasy or gummy deposits with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680). Also steam clean the frame. Wipe the trouble light reel with a cloth dampened lightly with solvent.

(2) Inspect the enclosure for defective door latches, loose or damaged lifting handles, rusted, corroded, or hard-to-operate hinges, and cracks and severe dents. Lubricate hard-to-operate hinges and latches. Drill out loose handle mounting rivets and install new rivets. Replace handles if necessary.

(3) Inspect the frame for cracked or broken weldments, bent members, and damaged lifting eye mounting threads. Clean up defective threads with a thread chaser. Straighten bent frame members.

(4) Inspect the trouble light reel for damaged electrical leads and connectors, defective light socket and faulty operation. Pull out the electrical cord full length and check the cord for cracks, deteriorated or abraded insulation, exposed wires, or other damage. Check that the return spring fully rewinds the cord after it is pulled out.

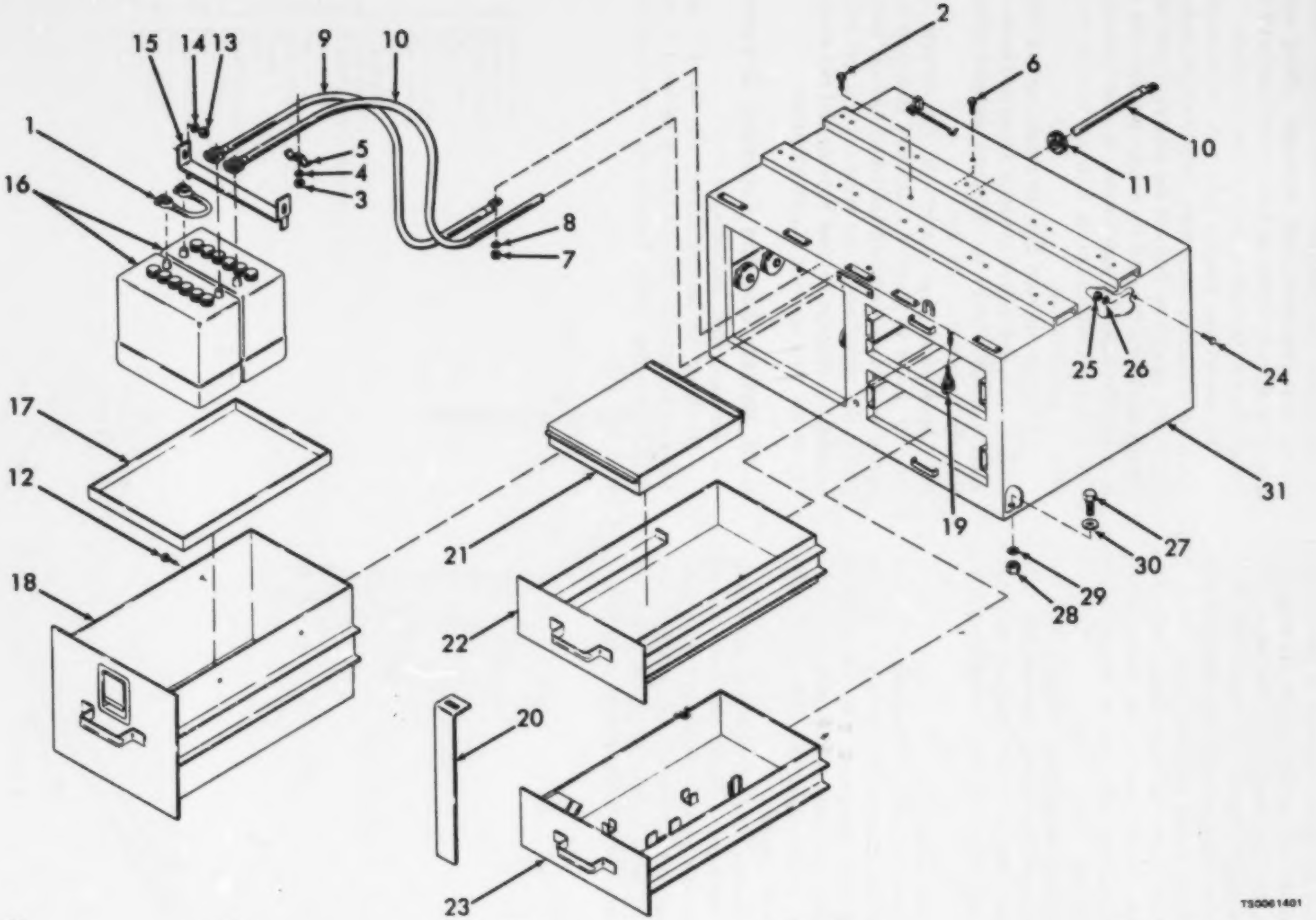
(5) Inspect the tool box for cracks, severe rust, broken latch, and defective hinge. Lubricate hard-to-operate hinge. Touch up defective painted areas. Replace a defective tool box.

c. Installation. Installation is the reverse of removal. Refer to figure 4-1. Be sure to install the spacer washers (3) between the frame and enclosure. Check the operation of the trouble light reel after reassembly. Engage the fuel housing and cap assembly in the fuel opening of the enclosure.

4-18. Battery Box and Accessory Drawers

a. Removal and Disassembly.

(1) Open the battery drawer (18, fig. 4-2) and remove the batteries (16) and battery cables (1, 9, and 10) per paragraph 4-23*b*. Remove the drawer and battery tray (17).



1. Connector cable
2. Cap screw
3. Nut
4. Lock washer
5. Clamp
6. Cap screw
7. Nut
8. Lock washer
9. Ground cable
10. Battery cable
11. Grommet
12. Cap screw
13. Nut
14. Lock washer
15. Battery tiedown
16. Battery
17. Battery tray
18. Battery drawer
19. Lock
20. Lock strap
21. Accessory drawer tray
22. Top accessory drawer
23. Bottom accessory drawer
24. Cap screw
25. Nut
26. Lock washer
27. Cap screw
28. Nut
29. Lock washer
30. Flat washer
31. Battery box assembly

Figure 4-3. Battery box assembly, exploded view.

(2) Unlock and remove the lock (19) and lock strap (20). Remove all accessories from the accessory drawer tray (21), top accessory drawer (22), and bottom accessory drawer (23).

(3) If removal of the battery box (31) is required, it will be necessary to remove the enclosure and frame (para 4-17) and hose reels (para 4-51). Remove the cap screws (27), nuts (28), lock washers (29), and flat washers (30); remove the battery box from the frame.

b. Cleaning and Inspection.

(1) Steam clean all drawers and trays. If the battery box was removed, steam clean it. Remove any greasy or gummy deposits with dry cleaning solvent (fed. spec. P-D-680).

(2) Inspect all sheet metal parts for cracked or broken weldments, dents, and distortion. Reweld and straighten parts as necessary.

(3) Check the hinge of the accessory drawer tray. Lubricate as necessary to provide free operation.

(4) Check for loose, chipped, or worn paint, rusted areas, and other surface damage. Remove defective paint down to bare metal, and reprime and touch up as necessary.

c. Reassembly and Installation. Reassembly and installation is the reverse of removal and disassembly. Refer to figure 4-2. Apply a light coat of lubricant to sliding surfaces of drawers to insure easy operation.

Section IX. FUEL SYSTEM

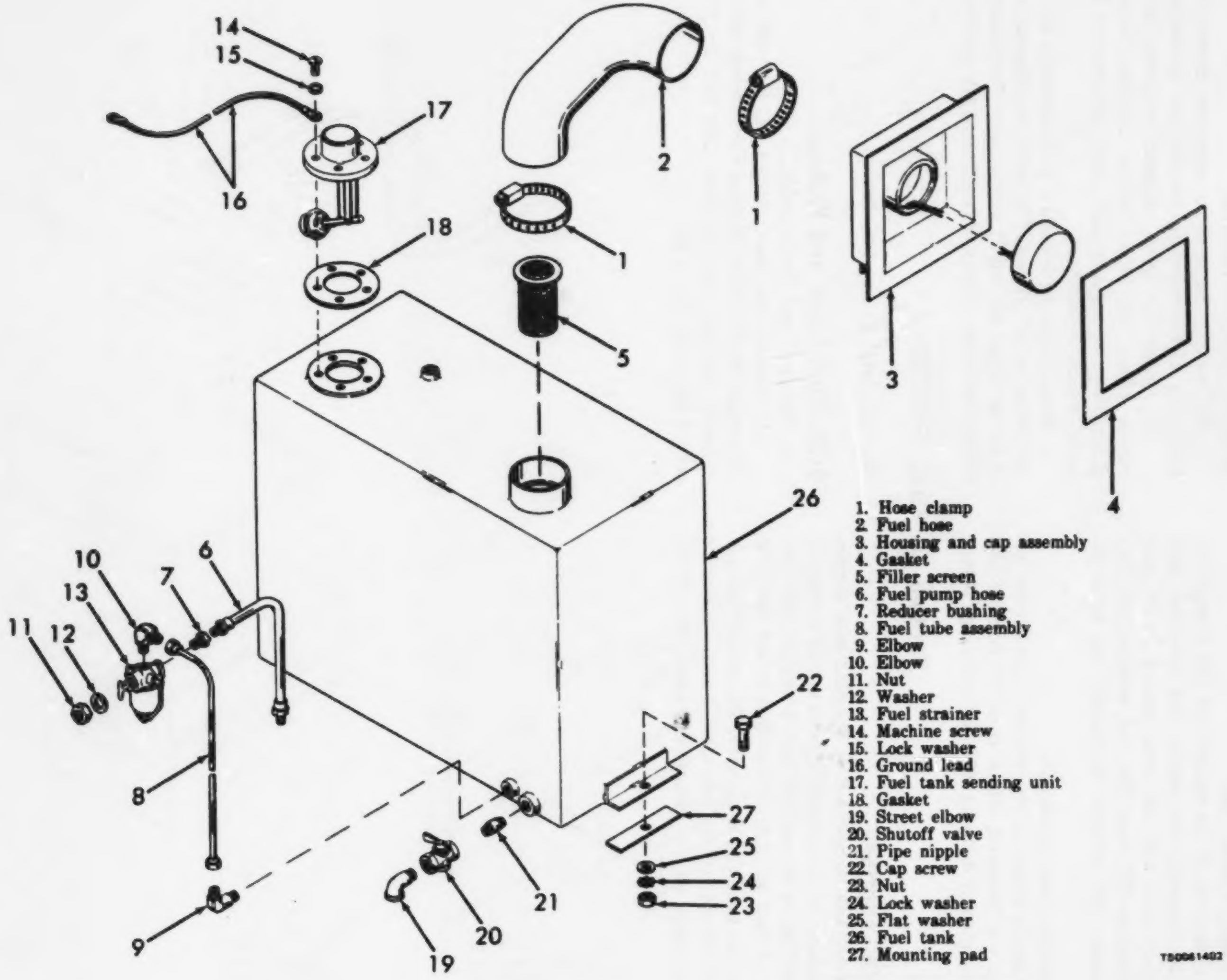
4-19. Description.

The fuel tank is mounted on the skid base within the enclosure of the lubricating and servicing unit. It provides fuel to the engine that drives the air compressor. A fuel strainer is installed in the fuel line between the tank and the engine. The fuel level sending unit mounted on the fuel tank is connected to the electrical gage on the instrument panel to monitor the fuel level in the fuel tank.

4-20. Fuel Lines and Fittings.

a. Removal and Disassembly.

(1) Loosen the hose clamps (1, fig. 4-3) and disengage the fuel hose (2) from the housing and cap assembly (3) and from the tank (26). Lift the filler screen (5) from the tank.



1. Hose clamp
2. Fuel hose
3. Housing and cap assembly
4. Gasket
5. Filler screen
6. Fuel pump hose
7. Reducer bushing
8. Fuel tube assembly
9. Elbow
10. Elbow
11. Nut
12. Washer
13. Fuel strainer
14. Machine screw
15. Lock washer
16. Ground lead
17. Fuel tank sending unit
18. Gasket
19. Street elbow
20. Shutoff valve
21. Pipe nipple
22. Cap screw
23. Nut
24. Lock washer
25. Flat washer
26. Fuel tank
27. Mounting pad

Figure 4-3. Fuel tank, lines, and fittings, exploded view.

(2) Drain the fuel tank into a container using the fuel shutoff valve (20).

(3) Disconnect the fuel tube assembly (8) and the fuel pump hose (6) and related fittings (7, 9, and 10) from the fuel strainer (13) and fuel tank (26). Disconnect opposite end of fuel pump hose (6) from the carburetor.

(4) Remove the shutoff valve (20) and its fittings (19 and 21).

(5) If the fuel housing and cap assembly (3) is damaged, loosen the nut and rotate the handle to release the housing and cap assembly. Remove the assembly and the gasket (4).

(6) Remove the nut (11) and washer (12), and remove the fuel strainer (13)

b. Cleaning and Inspection.

(1) Clean all metallic parts with dry cleaning solvent (fed. spec. P-D-680); dry thoroughly. Wipe the hoses with a cloth dampened lightly with solvent.

(2) Check the fuel hose assembly and fuel tube assembly for cracks, clogging, damaged threads. Replace if damaged.

(3) Service the fuel strainer (para 3-9*a*). Replace the filter element if clogged.

(4) Inspect all fittings for damaged threads, cracks, and other damage; replace damaged parts.

(5) Inspect the fuel hose for cracks, tears, and deterioration; replace a damaged fuel hose.

c. Reassembly and Installation. Reassembly and installation are the reverse of removal and disassembly. Refer to figure 4-3. After reassembly, fill the fuel tank and check for leaks.

4-21. Fuel Tank.

a. Removal and Disassembly.

(1) Remove the enclosure (para 4-17).

(2) Drain the fuel tank and remove fuel lines and fittings (para 4-20).

(3) Disconnect the ground lead (16, fig. 4-3).

(4) Remove the screws (14) and lock washers (15) that secure the fuel tank sending unit (17) to the fuel tank; remove the sending unit.

(5) Remove the cap screws (22), nuts (23), lock washers (24), and flat washers (25) that secure the fuel tank (26) to the skid base; remove the fuel tank.

b. Cleaning and Inspection.

(1) Flush out the fuel tank with dry cleaning solvent (fed. spec. P-D-680). Wipe off the fuel tank sending unit with a cloth dampened with solvent.

WARNING

You are not authorized to repair the fuel tank. If emergency repairs are required, do not perform any welding or other fuel tank repairs that involve heat or spark without first purging all gasoline fumes from the tank. Failure to heed this warning may result in a severe explosion that could cause injury or death.

(2) Inspect the fuel tank for cracks, severe dents, and damaged threads. Replace damaged fuel tank.

(3) Inspect the fuel tank sending unit for cracks, rough or catching movement of the float, and for damaged terminals. Replace a damaged sending unit.

c. Reassembly and Installation. Reassembly and installation of the fuel tank is the reverse of removal and disassembly. Refer to figure 4-3.

Section X. ENGINE ELECTRICAL SYSTEM

4-22. General

a. The engine electrical system is powered by the two batteries mounted in the battery drawer. Refer to figure 1-3 for the engine electrical system diagram. Battery charge is maintained by the engine-mounted generator. The system provides current to power the starting motor to enable you to crank the engine and to provide power to the engine controls. This system also provides power to the trouble light reel.

b. Two oil pressure sensors and one oil temperature sensor are mounted on the engine and connected into the engine electrical system to protect the engine against low oil pressure conditions and overheating. The low oil pressure switch and the oil pressure sender are mounted on a manifold on the engine base, connected to the engine through a tube assembly. The high oil temperature switch is connected to an adapter at the front of the engine under the starting pulley.

4-23. Batteries and Cables

a. Service. To charge batteries, proceed as follows:

(1) Remove caps and check the electrolyte level in each cell. If any are low, fill to proper level with distilled water.

WARNING

Do not smoke or use an open flame in the vicinity when servicing the batteries. Batteries generate hydrogen gas, which is highly explosive.

(2) Start engine and allow it to run for 10 to 15

minutes. Stop the engine and check the batteries with a hydrometer. A fully charged battery shall have a minimum specific gravity of 1.275 at 75°F (24°C).

(3) If the specific gravity of the electrolyte is less than 1.250, the batteries must be charged before use. When you charge the battery, use a constant current charger. Check the specific gravity of the electrolyte every 30 minutes. The batteries are fully charged when you get a constant specific gravity reading for three 30-minute intervals.

CAUTION

Constant-current battery charging is always preferred. If you must use a constant-potential charger, battery temperatures must be maintained at less than 130°F (54°C) by interrupting the charging procedure as this temperature is approached.

(4) During charging, check the electrolyte level frequently. Add distilled water when necessary to maintain the battery electrolyte level. Continue charging after adding water to assure proper mixing of the solution.

(5) Charge the batteries a minimum of once each month when the batteries are not in service. If the batteries fail to take or maintain a charge, replace them.

b. Removal.

(1) Pull out the battery drawer, disconnect the connector cable (1, fig. 4-2), battery cable (10), and ground cable (9) from the batteries. Disconnect the opposite ends of the cables and remove them from the lubricating and servicing unit.

(2) Remove the four cap screws (12), nuts (13), and lock washers (14) that secure the two battery tiedowns (15) to the battery drawer (18). Lift the batteries from the drawer.

c. Cleaning and Inspection.

(1) Clean the battery tops and the cable ends with a solution of water and baking soda to neutralize any acid on the parts. Prevent the solution from entering the battery.

(2) Flush the metallic parts with a solution of water and baking soda to neutralize any spilled acid.

(3) Inspect the batteries for cracks, loose terminals, and other damage. Replace damaged batteries.

(4) Inspect the battery cables for corrosion, damaged clamps, broken cable strands, and deteriorated or abraded insulation. Replace if damaged.

(5) If necessary, service the batteries as directed in subparagraph *a* above.

d. Reassembly and Installation. Refer to figure 4-2 and install the batteries and cables in the reverse order of removal. After installation, be sure that you coat the battery terminals with GAA lubricant or petroleum jelly to prevent corrosion. Be sure the negative cable is connected to ground and that the positive cable is connected to the starter terminal.

4-24. Starting Motor

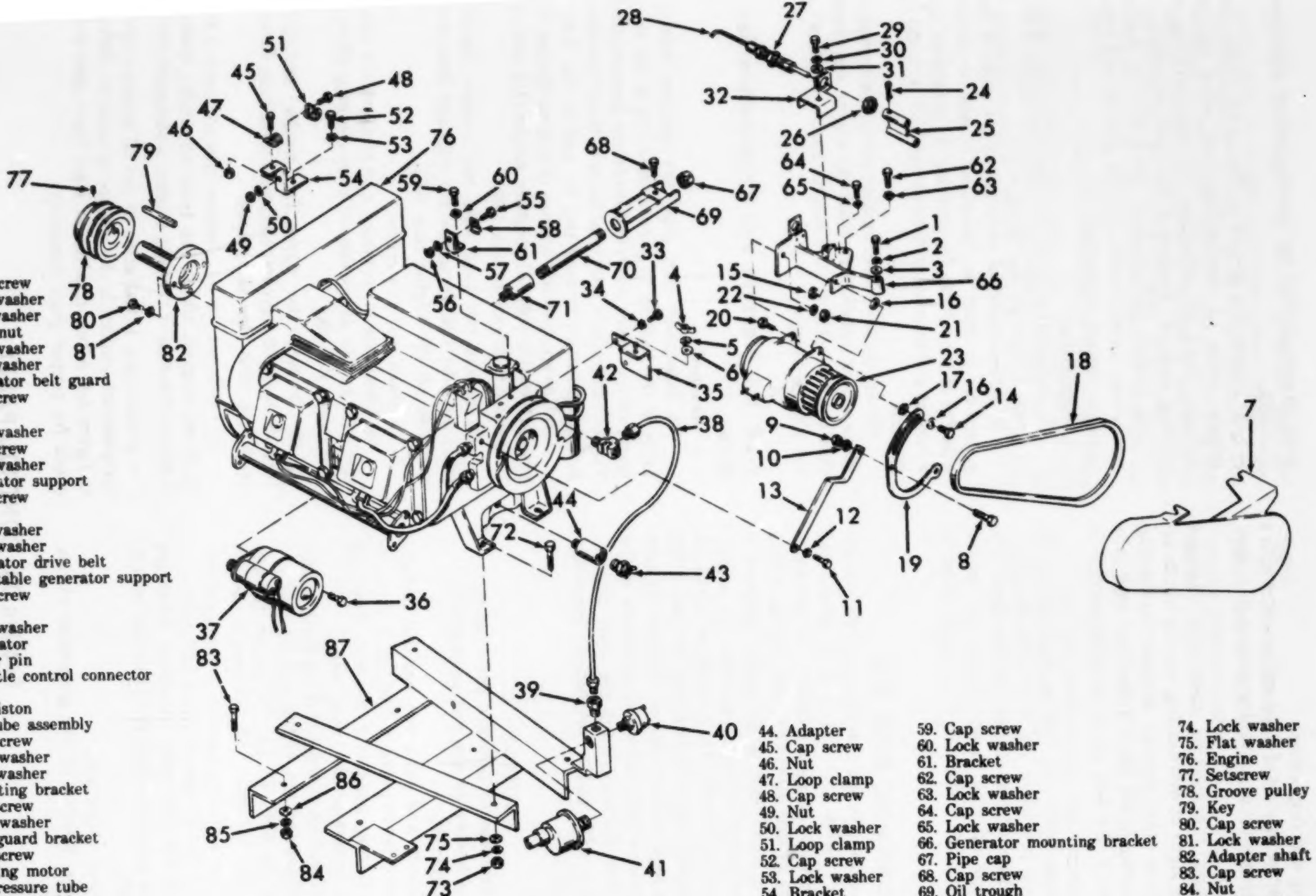
a. Starting Motor Checkout. If the starting motor fails to crank the engine, first check to make sure that the engine crankshaft is free and that the engine is not seized. If the engine turns over without application of excessive force, use a DC voltmeter to check that 24 volts is applied to the starting motor when the STARTER pushbutton is pressed. If the starting motor fails to rotate the engine with the correct voltage applied, replace the starting motor.

b. Removal.

(1) Disconnect and tape the positive battery cable from the battery terminal. This is necessary to prevent shorting of the engine electrical system.

(2) Tag and disconnect the starting motor electrical leads.

(3) Remove the two cap screws (36, fig. 4-4) that secure the starting motor (37) to the engine; pull straight out on the starting motor to disengage the pinion from the engine ring gear.



1. Cap screw
2. Lock washer
3. Flat washer
4. Wing nut
5. Lock washer
6. Flat washer
7. Generator belt guard
8. Cap screw
9. Nut
10. Lock washer
11. Cap screw
12. Lock washer
13. Generator support
14. Cap screw
15. Nut
16. Flat washer
17. Lock washer
18. Generator drive belt
19. Adjustable generator support
20. Cap screw
21. Nut
22. Lock washer
23. Generator
24. Cotter pin
25. Throttle control connector
26. Nut
27. Air piston
28. Air tube assembly
29. Cap screw
30. Lock washer
31. Flat washer
32. Mounting bracket
33. Cap screw
34. Lock washer
35. Belt guard bracket
36. Cap screw
37. Starting motor
38. Oil pressure tube
39. Reducing bushing
40. Low oil pressure switch
41. Oil pressure sender
42. Tee
43. Oil temperature cutout switch
44. Adapter
45. Cap screw
46. Nut
47. Loop clamp
48. Cap screw
49. Nut
50. Lock washer
51. Loop clamp
52. Cap screw
53. Lock washer
54. Bracket
55. Cap screw
56. Nut
57. Lock washer
58. Cable clamp
59. Cap screw
60. Lock washer
61. Bracket
62. Cap screw
63. Lock washer
64. Cap screw
65. Lock washer
66. Generator mounting bracket
67. Pipe cap
68. Cap screw
69. Oil trough
70. Pipe nipple
71. Adapter
72. Cap screw
73. Nut
74. Lock washer
75. Flat washer
76. Engine
77. Setscrew
78. Groove pulley
79. Key
80. Cap screw
81. Lock washer
82. Adapter shaft
83. Cap screw
84. Nut
85. Lock washer
86. Flat washer
87. Engine base

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Figure 4-4. Engine and accessories, exploded view.

c. Cleaning and Inspection.

(1) Wipe the exterior of the starting motor with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680).

(2) Inspect the starting motor for damaged pinion teeth, signs of overheating, seizing of the armature shaft, or other damage. Replace the starting motor if damaged or if it failed to meet the requirements of the test given in subparagraph *a* above.

d. Installation. Install the starting motor by reversing the removal procedure. Refer to items 36 and 37, figure 4-4. Make electrical connections per figure 1-3. Check that the starting motor cranks the engine when the STARTER switch on the control panel is pressed.

4-25. Generator and Drive Belt

a. Generator Belt Tension Adjustment. To provide long generator drive belt life and to assure the required generator output, maintain a generator drive belt tension that allows the belt (18, fig. 4-4) to be deflected one-half inch when thumb pressure is applied at midpoint between pulleys. To adjust, loosen the nuts (9, 15, and 21) on the cap screws (8, 14, and 20) and adjust the position of the generator (23) to provide the required belt tension. Tighten the nuts on the cap screws while holding the generator in the required position. Do not tighten the drive belt excessively. This will cause premature generator bearing failure.

b. Removal.

CAUTION

Do not attempt to operate the engine when the batteries are not connected to the generator.

(1) Disconnect and tape the positive battery cable at the batteries to prevent shorting of the electrical system during generator removal. Tag and disconnect the generator electrical leads.

(2) Remove the belt guard attaching parts (1 thru 6, fig. 4-4) and remove the belt guard (7).

(3) Loosen the nuts, (9, 15, and 21) on the cap screws (8, 14, and 20) and push the generator (23) toward the engine as far as possible to decrease belt tension. Remove the generator drive belt (18).

(4) Remove the generator attaching hardware and remove the generator from the generator mounting bracket (66).

c. Cleaning and Inspection.

(1) Wipe the exterior of the generator with a cloth dampened with dry cleaning solvent (fed. s P-D-680).

(2) Inspect the generator for cracks, broken minals, signs of overheating, and other obv damage. Check the armature for rough, catchin binding rotation. Replace a defective generato

(3) Inspect the generator drive belt for cra brittleness, deterioration, fraying, glazing, and o damage; replace a damaged belt.

d. Installation.

(1) Installation is the reverse of removal. R to items 1 through 23, figure 4-4.

(2) After electrical connections are made to generator, it must be polarized to assure corr polarity of the output. To polarize the generator, a jumper and momentarily flash the RET terminal ground.

(3) Adjust drive belt tension per subparagrap above. After installation, start the engine and ch that the ammeter on the control panel indicates the charge range.

4-26. Oil Pressure and Temperature Se sors

a. Removal.

(1) Disconnect and tape the positive batt cable at the battery to prevent shorting of the el trical system when electrical leads are disconnect Tag and disconnect electrical leads to the oil press and temperature sensors (40, 41, and 43, fig. 4-

(2) Use an open end wrench to remove the low pressure switch (40), oil pressure sender (41), and temperature cutout switch (43).

(3) Loosen the tube nuts and remove the pressure tube (38) from the tee (42) and from manifold on the engine base (87).

b. Cleaning and Inspection.

(1) Clean the oil pressure and temperature s sors with a cloth dampened with dry cleaning solv (fed. spec. P-D-680).

(2) Inspect the parts for cracks, dama threads, loose or corroded electrical terminals. Cl terminals with fine sandpaper.

(3) Flush out the oil pressure tube to insure t it is not clogged. Check the tube for cracks, kin dents, and damaged threads; replace a damaged tu

c. Installation. Installation of the oil pressure a temperature sensors is the reverse of removal. Re to figure 4-4. After installation, start the engine a check for proper gage operation.

Section XI. CONTROL PANEL

4-27. General

a. The control panel provides a mounting for four gages: fuel level gage (2, fig. 2-1), air pressure g (4), engine oil pressure gage (1), and the ammeter (

The fuel level gage and the oil pressure gage are operated by the engine electrical system through sensors mounted on the fuel tank and on the engine. The ammeter is connected into the battery charging circuit to indicate the status of charge or discharge to the batteries. The air pressure gage is operated by air pressure through an air tube connected into the air system.

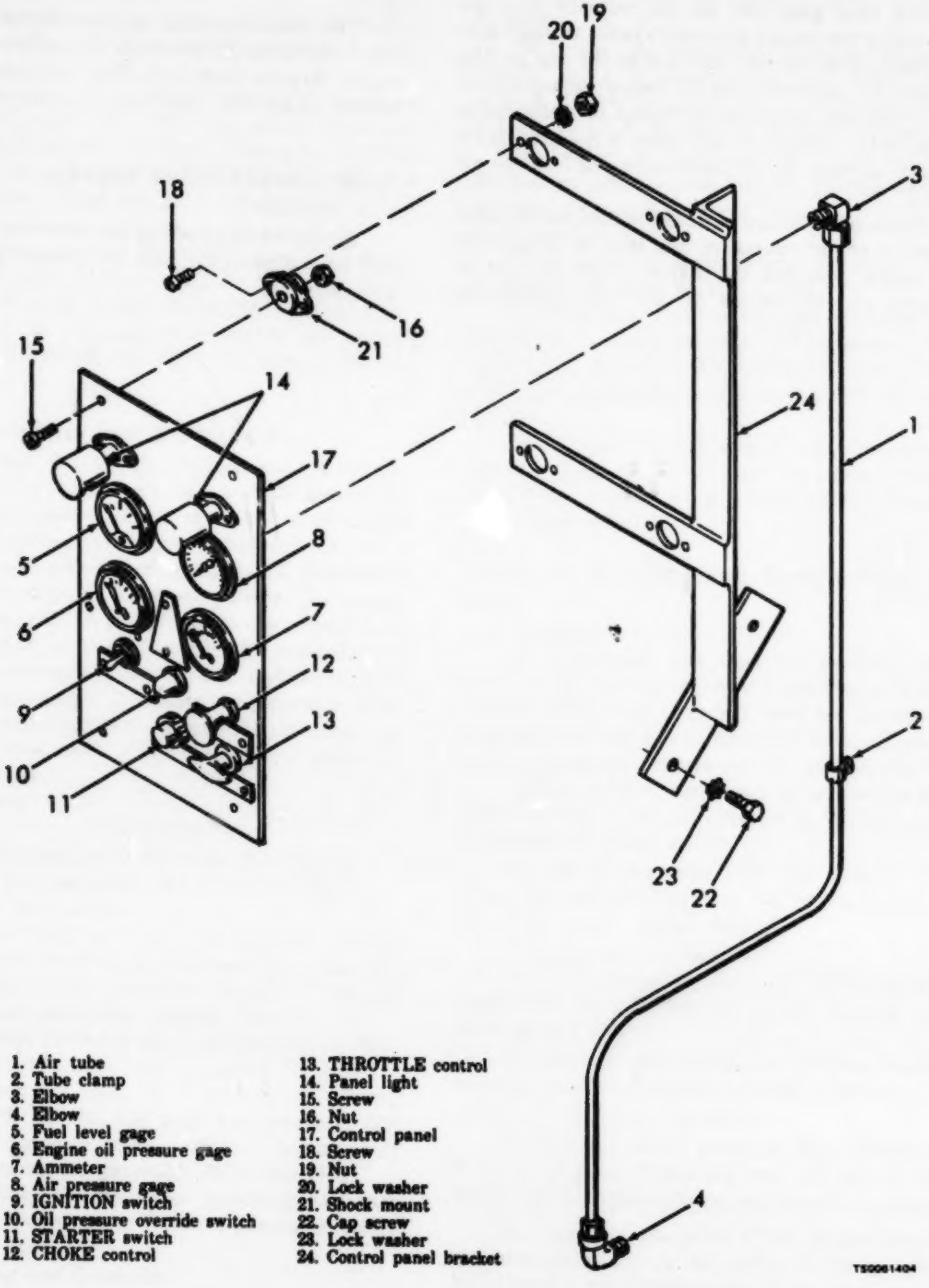
b. Three switches are mounted on the control panel to control engine operation. The ignition switch (10) is a toggle type, and the starter switch (9) and oil pressure override switch (6) are both pushbutton types.

c. Two manual controls are mounted on the control panel. One is the choke control (7) and the other is the engine throttle control (8). They connect to the carburetor choke lever and throttle lever, respectively.

4-28. Control Panel Gages

a. Removal.

(1) Disconnect and tag the electrical leads to the fuel level gage (5, fig. 4-5), oil pressure gage (6), and ammeter (7).



1. Air tube
2. Tube clamp
3. Elbow
4. Elbow
5. Fuel level gage
6. Engine oil pressure gage
7. Ammeter
8. Air pressure gage
9. IGNITION switch
10. Oil pressure override switch
11. STARTER switch
12. CHOKE control
13. THROTTLE control
14. Panel light
15. Screw
16. Nut
17. Control panel
18. Screw
19. Nut
20. Lock washer
21. Shock mount
22. Cap screw
23. Lock washer
24. Control panel bracket

Figure 4-5. Control panel and mounting, exploded view.

(2) Disconnect the air tube (1) that connects the air pressure gage to the air system.

(3) All gages mount in a similar manner. Remove the two nuts that secure the mounting brackets to the rear of the control panel (17). Remove the mounting bracket and pull the gages out through the front of the panel.

b. Cleaning and Inspection.

(1) Clean all gages with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680). Take care to prevent the entry of solvent into the interior of the gages.

(2) Inspect the gages for cloudy or cracked dial glass, discolored or illegible marking, bent or sticking dial pointers, and loose or corroded connectors. Replace defective gages.

c. Installation. Installation is the reverse of removal. Refer to figure 4-5. If necessary, you can refer to figure 1-3 for electrical connection information. After installation, start the engine and check for operation of the gages associated with the engine. When air pressure builds up in the air reservoir, check the operation of the air pressure gage.

4-29. Control Panel Switches

a. Removal.

(1) Disconnect and tape the positive battery cable at the battery to prevent shorting of the electrical system.

(2) Tag and disconnect all electrical leads to the control panel switches (9, 10, and 11, fig. 4-5).

(3) Remove the nuts that secure the switches to the control panel. You must remove the nuts from the front of the panel and remove the switches from the rear of the panel.

b. Cleaning and Inspection.

(1) Wipe the switches with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680). Take care to prevent entry of solvent into the switch.

(2) Check the operation of each switch. The toggle switch must operate positively to each of its two positions. The two pushbuttons must press in without binding and must spring out when released.

(3) Use an ohmmeter to check electrical continuity through the switches. The toggle switch must indicate continuity when operated to ON and must break continuity when operated to OFF. The pushbuttons must show continuity when pressed and must break continuity when released.

(4) Inspect the switches for cracks and loose, damaged, or corroded terminals. Clean terminals with fine sandpaper if necessary. Replace defective switches.

c. Installation. Installation is the reverse of removal. Refer to figure 4-5. If necessary, you can refer to figure 1-3 for electrical connection information. After installation, start the engine to check that the switches operate properly.

4-30. Choke and Throttle Controls.

a. Removal.

(1) Disconnect the throttle control (13, fig. 4-5) from the throttle lever of the carburetor. Loosen the nut (56, fig. 4-4) on the cap screw (55) to loosen the clamp (58) that secures the throttle control to the bracket (61). Disengage the throttle control.

(2) Disconnect the choke control (12, fig. 4-5) from the choke control lever on the carburetor. Remove the cap screw (48, fig. 4-4), nut (49), and lock washer (50) that secure the choke control cable to the bracket (54). Disengage the choke control cable.

(3) Nuts at the back of the control panel secure the choke control (12, fig. 4-5) and the throttle control (13) to the control panel. Remove the controls by pulling them out through the front of the panel.

b. Cleaning and Inspection.

(1) Wipe the choke control and throttle control with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680). Do not saturate the control cables.

(2) Check the operation of the control cables in their sheathes. If necessary, lubricate them with light oil. If the sheathes are kinked or broken, or if the control cables stick in the sheathes, replace the controls.

c. Installation. Installation is the reverse of removal. When installing the controls, make sure that you adjust the positions of the control clamps to assure that the operation of the control knob on the control panel will allow full range of movement of the choke lever or throttle lever at the carburetor. lever at the carburetor.

4-31. Panel Lights

a. Service. To replace the bulb of a burned out panel light (14, fig. 4-5), pull off the hood to provide access to the bulb. Remove the bulb by pushing in and giving it a quarter turn counterclockwise to release it. Install a new bulb and replace the hood.

b. Removal.

(1) Disconnect the panel light electrical leads.

(2) Remove the two screws and nuts that secure each of the panel lights (14, fig. 4-5) to the instrument panel (17); pull forward on the lights to remove them.

c. Cleaning and Inspection.

(1) Wipe the panel lights with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680). If necessary, remove corrosion from the interior of the socket with fine sandpaper.

(2) Inspect the panel lights for cracks, corrosion, broken electrical leads, and other damage; replace

damaged lights.

d. Installation. Installation is the reverse of removal. If necessary, refer to the wiring diagram in figure 1-3 for wiring connection information.

4-32. Control Panel

a. Removal.

(1) Remove the control panel gages (para 4-28), switches (para 4-29), and choke and throttle controls (para 4-30).

(2) Remove the screws (15, fig. 4-5) and nuts (16) that secure the control panel (17) to the shock mounts (21); remove the control panel.

(3) Remove the screws (18), nuts (19), and lock washers (20) that secure the shock mounts (21) to the control panel bracket (24); remove the shock mou

b. Cleaning and Inspection.

(1) Wipe the control panel with a cloth d pened lightly with dry cleaning solvent (fed. spe D-680). Wipe the shock mounts with a dry clo

(2) Inspect the control panel for cracks, illegi markings, and missing name plates. Replace damaged.

(3) Inspect the shock mounts for distortion for deteriorated, brittle rubber. Replace defect shock mounts.

c. Installation. Installation is the reverse removal. Refer to figure 4-5. If necessary, refer figure 1-3 for electrical connection instructions.

Section XII. ENGINE EXHAUST SYSTEM

4-33. General

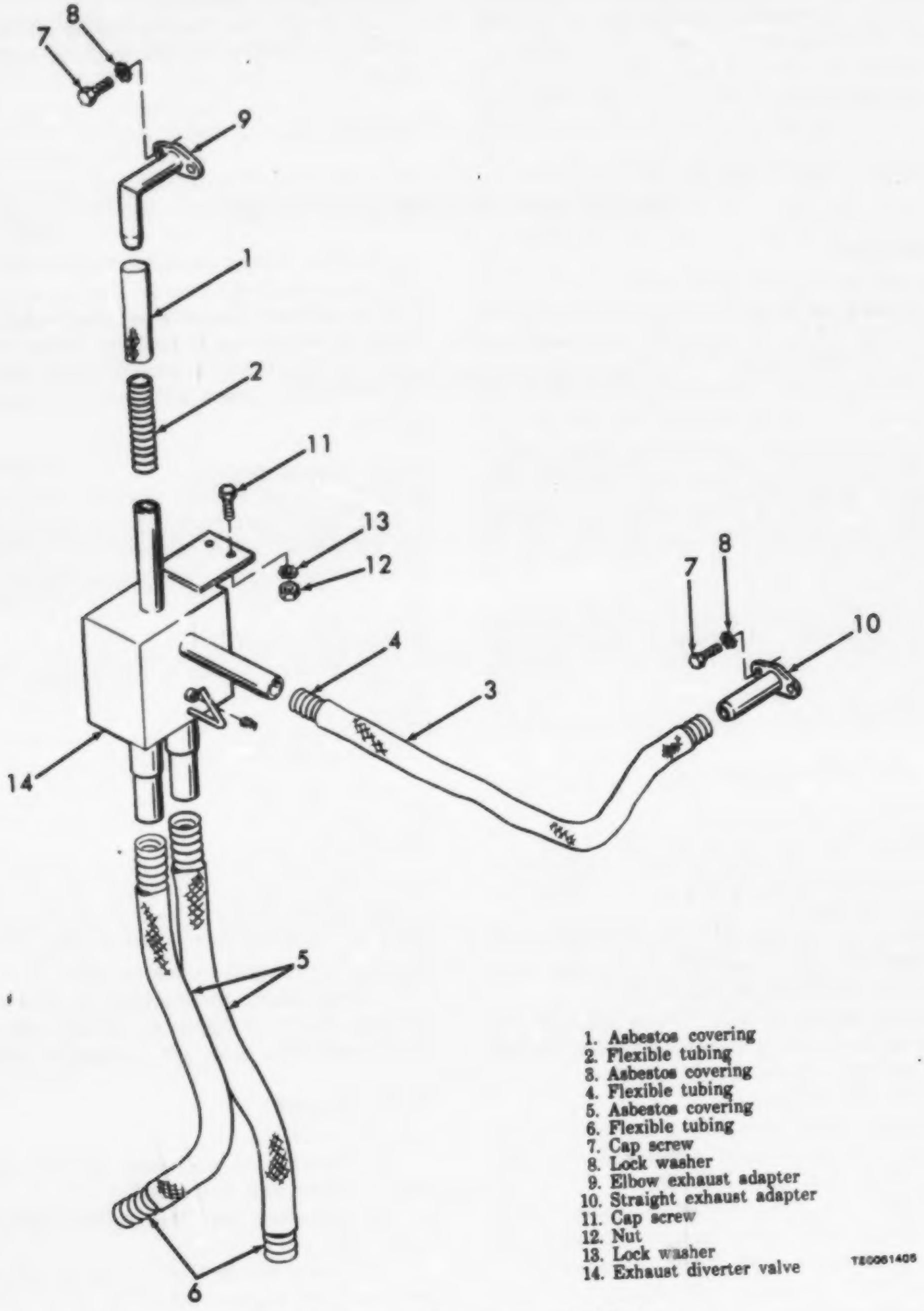
a. The engine exhaust system is equipped with an exhaust diverter valve to enable you to use the hot exhaust gas from the engine to warm the lubricants to make them flow more freely in cold weather. When the diverter valve handle is operated to warm the fluids, the exhaust gas is routed from the engine through tubing to the bottom of the lubricant reservoir to heat the lubricants. When the diverter valve handle is moved to the opposite position, the exhaust is vented through a pipe welded to the skid base so that it discharges under the vehicle.

b. The engine has two exhaust manifolds, one f the left bank of cylinders, the other for the rig bank. Adapters are connected to these manifolds facilitate connecting the tubing that conducts t gases to the diverter valve.

4-34. Exhaust Diverter Valve

a. Removal.

(1) Slide the flexible tubing (2, 4, and 6, fig. 4- from the adapters (9 and 10) on the engine, on t diverter valve (14), and on the lubricant reservoir a skid base. Slide the asbestos coverings (1, 3, and from the flexible tubing.



1. Asbestos covering
2. Flexible tubing
3. Asbestos covering
4. Flexible tubing
5. Asbestos covering
6. Flexible tubing
7. Cap screw
8. Lock washer
9. Elbow exhaust adapter
10. Straight exhaust adapter
11. Cap screw
12. Nut
13. Lock washer
14. Exhaust diverter valve

Figure 4-6. Engine exhaust system, exploded view.

(2) Remove cap screws (7) and lock washers (8) and remove adapters (9 and 10).

(3) Remove cap screws (11), nuts (12), and lock washers (13) and remove the diverter valve (14).

b. Cleaning and Inspection.

(1) Clean the flexible tubing and adapters with a wire brush. Remove any greasy or gummy deposits with dry cleaning solvent (fed. spec. P-D-680). Clean

the diverter valve with solvent and dry thoroughly.

(2) Inspect the asbestos coverings for fraying, abrasions, and deterioration. Replace if damaged.

(3) Inspect the diverter valve for cracks, severe rust or corrosion, and broken adapter pipes. Check for rough or restricted operation of the diverter valve handle. Replace the valve if it is damaged or if it fails to operate properly.

(4) Inspect the flexible tubing and the adapter for cracks, holes, severe corrosion, and other damage. Replace defective parts.

c. Installation. Installation is the reverse of removal. Refer to figure 4-6.

Section XIII. ENGINE AND DRIVE

4-35. General

a. The engine (3, fig. 3-4) is mounted on the welded engine base (5) which is secured to a mounting pad on top of the air reservoir. It is positioned beside the air compressor to facilitate the power transfer. The engine drives the compressor through a set of matched drive belts. The belts are protected by a guard (2) to prevent personnel injury and to prevent materials from getting caught between the pulleys and belts. Belt tension is adjusted by varying the position of the engine. An adjusting bolt (7) mounted on the mounting pad facilitates moving the engine to loosen or tighten the belt.

b. The drive pulley is mounted on the drive end of the engine crankshaft. An adapter, bolted to the crankshaft, mounts the pulley. The engine pulley is smaller than the compressor pulley to provide the required speed reduction between the components.

4-36. Drive Belt and Guard

a. Removal.

(1) Remove the cap screws (1 and 2, fig. 4-9), nuts (3), lock washers (4), and flat washers (5) that secure the drive belt guard (6) to the engine and compressor (22); remove the guard.

(2) Loosen the nuts (84, fig. 4-4) on the cap screws (83) that lock the engine base (87) to the mounting pad on the air reservoir (36, fig. 4-9).

(3) Loosen adjusting bolt (7) and push engine toward the air compressor to relieve tension on the drive belt set (9); remove the drive belts.

b. Cleaning and Inspection.

(1) Wipe the drive belts with a dry cloth. Clean the belt guard with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680).

(2) Inspect the drive belts for cracks, wear, fraying, glazing, brittleness, and deterioration. If either belt is damaged, both must be replaced as a matched set. Do not replace belts singly.

(3) Inspect the belt guard for cracks, broken weldments, distortion, severe dents, or any other damage that could impair its effectiveness. Replace a damaged belt guard.

WARNING

Do not operate the engine and compressor without the belt guard in place. Severe injury to operating personnel could result.

c. Installation. Installation of the drive belts and guard is the reverse of removal. Refer to figures 4-4 and 4-9. Note that you should adjust belt tension as directed in paragraph 3-11*b* before installing the belt guard.

4-37. Drive Pulley

a. Removal.

(1) Remove the drive belts and guard (para 4-36*a*).

(2) Loosen the setscrew (77, fig. 4-4) and pull the groove pulley (78) from the adapter shaft (82) on the engine crankshaft. Remove the key (79).

(3) Remove the cap screws (80) and lock washers (81) that secure the adapter shaft to the crankshaft; remove the adapter shaft.

b. Cleaning and Inspection.

(1) Clean the groove pulley and adapter shaft with dry cleaning solvent (fed. spec. P-D-680). Dry thoroughly.

(2) Inspect the groove pulley and adapter shaft for cracks, chips, and distortion. Inspect the grooves of the pulley for roughness, wear, burrs, and other damage. Remove minor burrs with a fine stone. Replace a damaged pulley or shaft.

c. Installation. Installation is the reverse of removal. Refer to figure 4-4. Install the drive belt guard and drive belts per paragraph 4-26*c*.

4-38. Engine

a. Removal.

(1) Remove the enclosure from the lubricating and servicing unit (para 4-17*a*).

(2) Disconnect fuel lines to the engine fuel pump (para 4-20).

(3) Disconnect the throttle control and choke control from the engine carburetor (para 4-30).

(4) Tag and disconnect the electrical lead to the oil temperature sensor on the engine (para 4-26) and remove the sensor. Remove the control panel and remove the control panel bracket (24, fig. 4-5) from the engine flywheel housing.

(5) Remove the exhaust diverter valve and exhaust piping from the engine (para 4-34).

(6) Remove the starting motor (para 4-24) and enerator (para 4-25).

(7) Remove the drive belts and guard (para 4-36).

(8) Remove the drive pulley and adapter shaft para 4-37).

(9) Disconnect the air piston (27, fig. 4-4) from he throttle control mechanism.

(10) Disconnect the oil pressure tube from be-ween the engine and the manifold on the engine ase (para 4-26*a*).

(11) Wrap a sling around the engine (76) and sup-ort the engine weight. Remove the four cap screws 72), nuts (73), lock washers (74), and flat washers (75) that secure the engine to the engine base (87); lift off the engine and set it on blocks.

(12) Remove the pipe cap (67) from the nipple (70), draining the oil in a container. Loosen the cap screw (68) and pull the engine oil trough (69) from the pipe nipple. Remove the pipe nipple (70) and adapter (71).

(13) Refer the engine to higher echelon maintenance for repair.

b. Installation. Engine installation is the reverse of removal. Refer to figure 4-4. Make all adjustments indicated in the installation portion of the referenced paragraphs before starting the engine.

Section XIV. AIR SYSTEM

4-39. General.

a. Air pressure for your lubricating and servicing is supplied by an engine-driven compressor that is mounted on the air reservoir. Air is forced into the reservoir through an aftercooler line that helps to dissipate heat of compression before it enters the reservoir. A check valve is connected between the aftercooler and the reservoir to prevent reverse flow of air to the air compressor. The air reservoir is protected by a safety valve which prevents excessive pressures in the air system in the event of failure of the compressor unloader system.

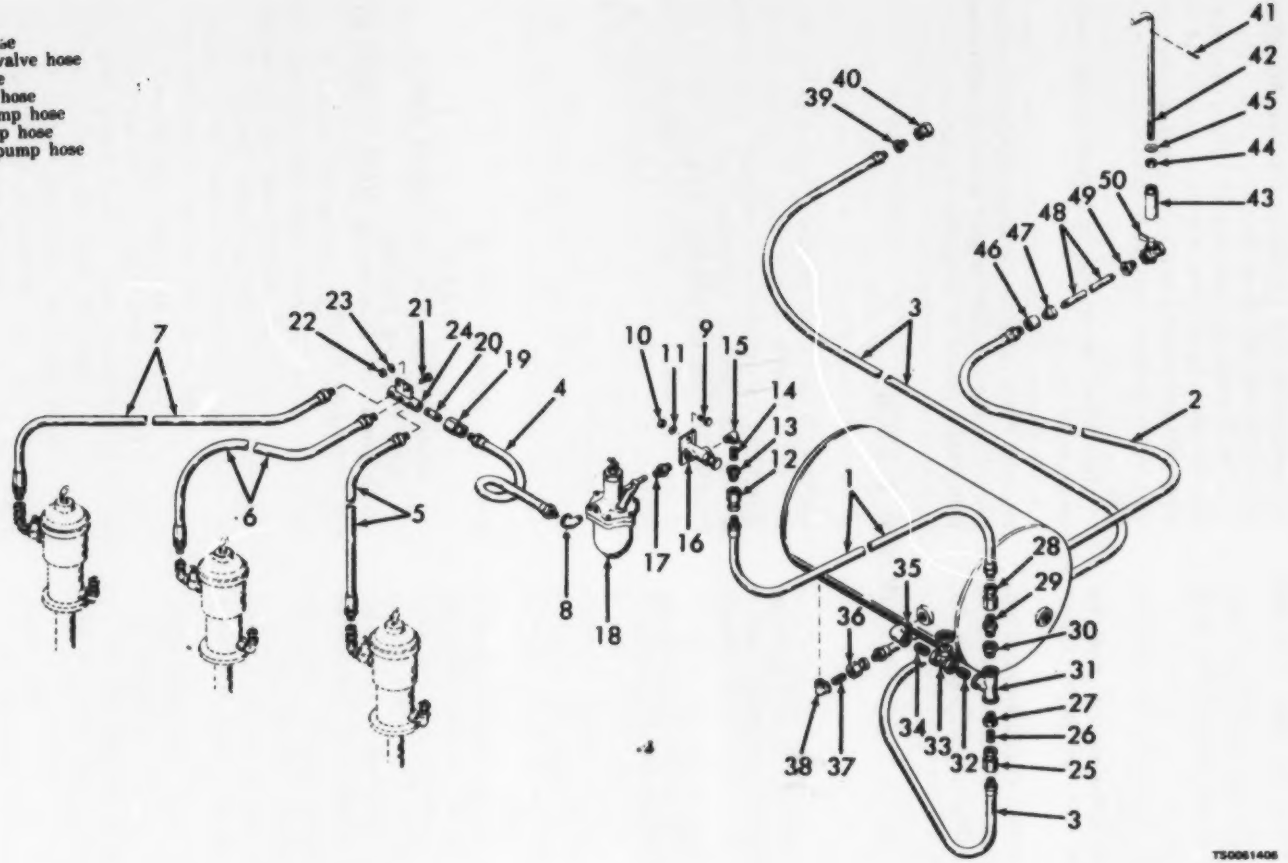
b. Air pressure from the air reservoir is applied to an air manifold through an air plunger valve and alcohol dispenser. From the manifold it is applied to the air-driven lubricant pumps. The pumps operate when there is air pressure in the reservoir and the air plunger valve control knob is pulled out. The alcohol dispenser is used when you are operating at less than 32°F (0°C). It adds alcohol vapor to the air system, preventing accumulations of moisture from freezing in the air-operated equipment and causing you trouble. Air from the reservoir is also applied to one of the hose reels at the rear of the lubricating and servicing unit to help you when inflating tires, for cleaning parts, and for other applications requiring compressed air. A reservoir drain valve is installed at the lower rear of the unit. You can operate this valve with an operating handle at the rear of the unit.

4-40. Air System Piping

WARNING

Drain all air from air system before disconnecting piping.

a. Removal and Disassembly. Refer to figure 4-7 and proceed as follows:



1. Receiver-to-air valve hose
2. Receiver-to-tank drain valve hose
3. Receiver-to-air reel hose
4. Evaporator-to-manifold hose
5. Manifold-to-gear oil pump hose
6. Manifold-to-grease pump hose
7. Manifold-to-engine oil pump hose
8. Street elbow
9. Cap screw
10. Nut
11. Lock washer
12. Straight swivel
13. Reducer bushing
14. Pipe nipple
15. Street elbow
16. Master air valve
17. Adapter
18. Alcohol dispenser
19. Straight swivel
20. Pipe nipple
21. Cap screw
22. Nut
23. Lock washer
24. Pump manifold
25. Straight swivel
26. Pipe nipple
27. Reducer bushing
28. Straight swivel
29. Adapter
30. Reducer bushing
31. Pipe tee
32. Pipe nipple
33. Shutoff valve
34. Pipe nipple
35. Street elbow
36. Straight swivel
37. Pipe nipple
38. Street elbow
39. Reducer bushing
40. Straight swivel
41. Cotter pin
42. Operating handle
43. Valve operator
44. Nut
45. Washer
46. Coupling
47. Reducer bushing
48. Pipe
49. Reducing bushing
50. Air drain valve

(1) Disconnect and remove hoses (1 through 7).

(2) Remove the assembled master air valve (16) and alcohol dispenser (18) by removing the two cap screws (9), nuts (10), and lock washers (11). Remove air valve and adapter (17) from alcohol dispenser.

(3) Remove fittings (12 through 15, 19, and 20).

(4) Remove two cap screws (21), nuts (22), and lock washers (23) that secure the pump manifold (24) to the frame (15, fig. 4-1).

(5) Remove fittings (25 through 32, fig. 4-7) and shutoff valve (33). Remove fittings (34 through 38).

(6) Remove cotter pin (41), handle (42), valve operator (43), nut (44), and washer (45) from air drain valve (50). Remove air drain valve, pipe (48), and remaining fittings (46, 47, and 49).

b. Cleaning and Inspection.

(1) Clean the air hoses with a cloth dampened lightly with dry cleaning solvent (fed. spec. P-D-680). Clean metallic fittings by washing in solvent.

(2) Inspect hoses for cracks, frayed or abraded coverings, brittle or deteriorated rubber, and damaged threads of hose ends. Replace damaged hoses.

(3) Check the operation of the master air valve. It must open and close smoothly and easily. Check for damaged threads and for leaks. Replace valve if necessary.

(4) Inspect fittings for cracks and damaged threads; replace damaged fittings.

(5) If necessary, repair the alcohol dispenser per paragraph 4-41.

c. Reassembly and Installation.

(1) Reassembly and installation is the reverse of removal and disassembly. Refer to figure 4-7.

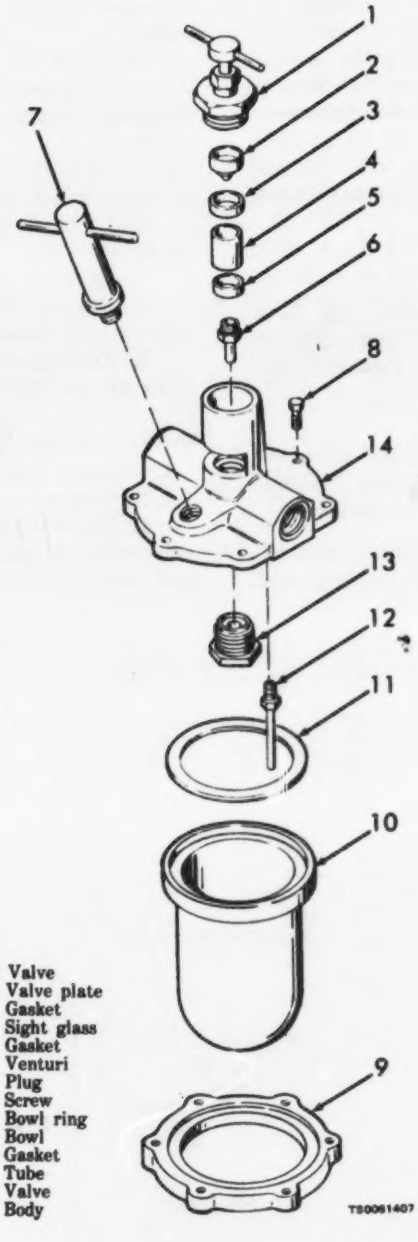
(2) After the air system is reassembled, check for leaks with a soap bubble solution. Correct any leaks.

4-41. Alcohol Dispenser

a. Removal and Disassembly.

(1) Remove the alcohol dispenser (para 4-40).

(2) Unscrew the valve (1, fig. 4-8) and remove the valve plate (2), gasket (3), sight glass (4), gasket (5), and venturi (6) from the body (14).



1. Valve
2. Valve plate
3. Gasket
4. Sight glass
5. Gasket
6. Venturi
7. Plug
8. Screw
9. Bowl ring
10. Bowl
11. Gasket
12. Tube
13. Valve
14. Body

Figure 4-8. Alcohol dispenser, exploded view.

(3) Unscrew the plug (7) from the body.

(4) Remove the six screws (8) that secure the bowl ring (9) to the body (14). Remove the bowl (10) and gasket (11).

(5) Carefully remove the tube (12) and valve (13) from the body (14).

b. Cleaning and Inspection.

(1) Discard and replace all gaskets. remaining parts with dry cleaning solvent (fed P-D-680); dry thoroughly.

(2) Inspect the sight glass and the bov cracks, chips, and discoloration. Replace if nece

(3) Inspect the valve for cracks, damaged threads, and faulty seating surfaces. Inspect the mating seating surfaces on the valve plate for scoring or damage. Replace damaged parts.

(4) Inspect all other parts for cracks, distortion, damaged threads, and other damage; replace damaged parts.

c. Reassembly and Installation.

(1) Reassembly is the reverse of disassembly. Refer to figure 4-8. Use new gaskets to minimize the possibility of leaks. Make sure all seating surfaces are clean and free from foreign particles.

(2) Install the alcohol dispenser as shown in figure 4-7. After installation, check connections with a soap bubble solution to detect any leaks.

4-42. Air Compressor Replacement

a. Removal.

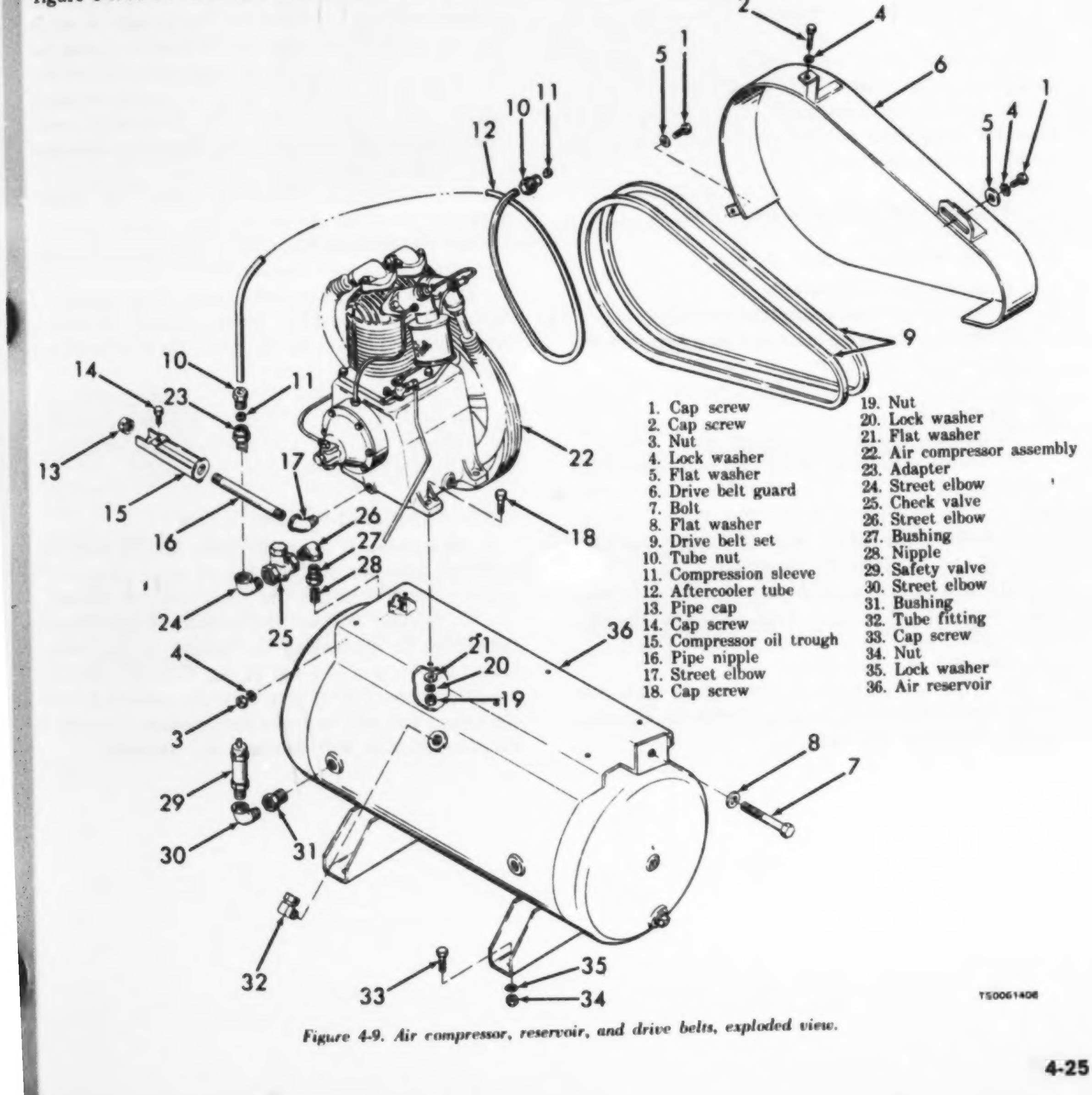
(1) Remove the enclosure from the lubricating and servicing unit (para 4-17).

(2) Remove the compressor drive belts and guard (para 4-36).

WARNING

Drain all air from the air system before disconnecting piping.

(3) Loosen tube nuts (10, fig. 4-9) and disconnect the aftercooler tube (12) that interconnects the air compressor (22) and the air reservoir (36).



1. Cap screw
2. Cap screw
3. Nut
4. Lock washer
5. Flat washer
6. Drive belt guard
7. Bolt
8. Flat washer
9. Drive belt set
10. Tube nut
11. Compression sleeve
12. Aftercooler tube
13. Pipe cap
14. Cap screw
15. Compressor oil trough
16. Pipe nipple
17. Street elbow
18. Cap screw
19. Nut
20. Lock washer
21. Flat washer
22. Air compressor assembly
23. Adapter
24. Street elbow
25. Check valve
26. Street elbow
27. Bushing
28. Nipple
29. Safety valve
30. Street elbow
31. Bushing
32. Tube fitting
33. Cap screw
34. Nut
35. Lock washer
36. Air reservoir

Figure 4-9. Air compressor, reservoir, and drive belts, exploded view.

(4) Loosen the tube fitting (32) to release the tube from the air compressor assembly (22).

(5) Wrap a sling around the compressor and support the compressor weight with a hoist. Remove the four cap screws (18), nuts (19), lock washers (20), and flat washers (21) that secure the air compressor to the mounting pad on the air reservoir (36). Lift the compressor from the reservoir with a hoist.

(6) Remove the pipe cap (13) and drain the compressor oil into a container. Loosen the cap screw (14) and slide the oil trough (15) from the pipe nipple (16) and elbow (17).

(7) Refer to the compressor to direct support maintenance for repair.

b. Installation.

(1) Installation is the reverse of removal. Refer to figure 4-9.

(2) Install drive belts and adjust tension per paragraph 3-11*b*. Install belt guard.

(3) Service the compressor. Start the engine and allow the compressor to build up pressure. Use a soap bubble solution to check fittings for leaks. Correct any leaks.

(4) Install the enclosure (para 4-17).

4-43. Air Reservoir and Fittings.

a. Removal and Disassembly.

(1) Remove the enclosure (para 4-17).

(2) Remove the drive belts and guard (para 4-36).

(3) Remove the engine (para 4-38).

(4) Disconnect the air piping from the air reservoir (para 4-40*a*).

(5) Remove the air compressor (para 4-42*a*).

(6) Remove the check valve (25) and related fittings (23, 24, 26, 27, and 28, fig. 4-9) from the reservoir (36).

(7) Remove the safety valve (29) and related fittings (30 and 31) from the reservoir.

(8) Use a sling around the reservoir (36) and support the reservoir with a hoist. Remove the cap screws (33), nuts (34), and lock washers (35).

b. Cleaning and Inspection.

(1) Wipe the exteriors of the check valve and safety valve with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680).

(2) Flush out the interior of the reservoir wit solvent. Repeat until the solvent is no longe discolored after cleaning. Drain thoroughly.

WARNING

The air reservoir operates under high air pressure. Making structural repairs to the air reservoir could weaken it and make it unsafe for use. No repairs to the air reservoir are authorized. If it is damaged, you must replace it.

(3) Inspect the reservoir for cracks, severe dents, damaged threads, and broken weldments. Replace if damaged.

(4) Inspect the safety valve for cracks, dents, and damaged threads. Pull out on the plunger to check that its working parts are free. If possible, check the relief pressure of the valve. It must relieve at 200 psi.

(5) Inspect the check valve for cracks, damaged threads, and other damage. The check valve must allow flow in one direction only. Replace a damaged check valve.

(6) Inspect all remaining parts for cracks, damaged threads, distortion, and other damage; replace damaged parts.

c. Reassembly and Installation.

(1) Reassembly and installation is the reverse of removal and disassembly. Refer to figure 4-9. Check the directional arrow on the check valve (25) to insure that flow is in the correct direction.

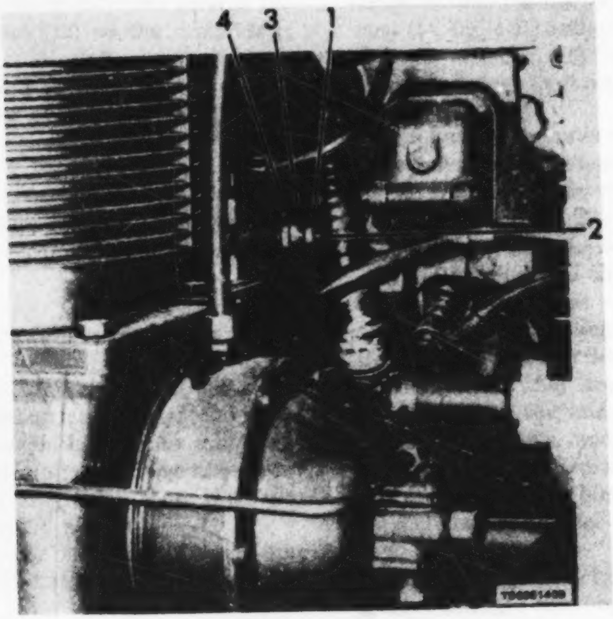
(2) Adjust drive belt tension per paragraph 3-11*b*.

(3) Start the engine. Allow air pressure to build up in the air reservoir. Use a soap bubble solution to check for leaks. Correct any leaks noted.

4-44. Compressor Pilot Valve

a. Adjustment. If the compressor fails to maintain reservoir pressure in the required range (140 to 170 psi), you should adjust the pilot valve as follows:

(1) To raise or lower the pressure range without increasing or decreasing the spread of the range, loosen the outside lock nut (1, fig. 4-10) and turn the adjusting screw (2). If you turn the adjusting screw clockwise, you will increase the pressure. Turning it counterclockwise will decrease the pressure.



1. Adjusting screw lock nut
2. Adjusting screw
3. Adjusting barrel
4. Adjusting barrel lock nut

Figure 4-10. Compressor pilot valve showing adjustment points.

(2) To adjust the spread of the range (that is, to increase or decrease the difference between the cut-in and cut-out pressures), you should loosen the inner lock nut (4) and rotate the adjusting barrel (3). Turning the barrel clockwise will increase the spread between cut-in and cut-out pressures. Turning it counterclockwise will decrease the spread.

CAUTION

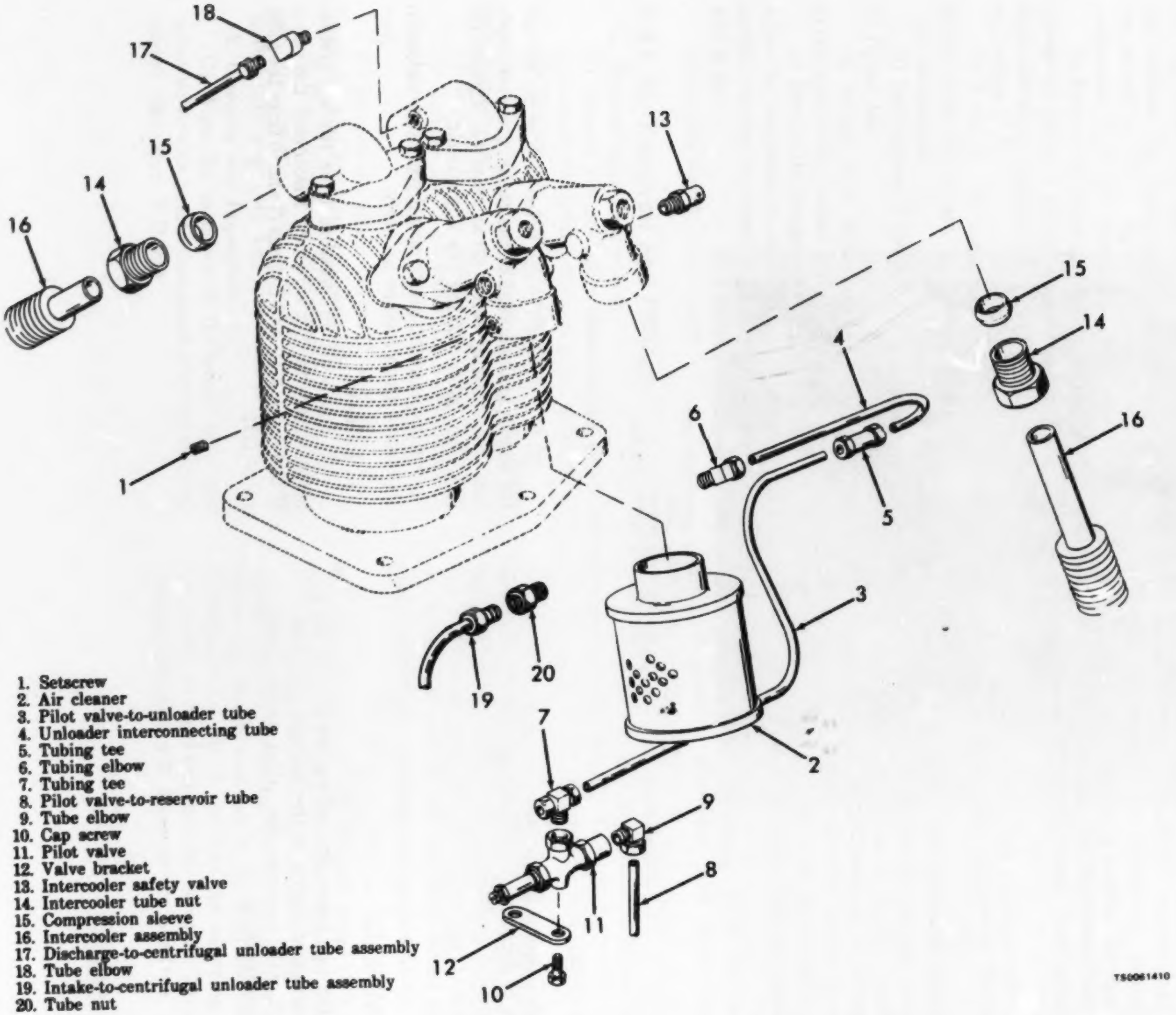
Do not leave the adjusting barrel (3) screwed down to the bottom position. It will prevent the pilot valve from controlling.

(3) If the overall range is too high or too low after adjusting the spread of the range, you must readjust the adjusting screw (2) as required. Tighten all lock nuts after making the adjustment.

(4) Replace the pilot valve if you cannot adjust it to control the pressure properly.

b. Removal.

(1) Drain all air pressure from the air system before disconnecting air lines. Disconnect the tubes (3 and 8, fig. 4-11) and fittings (7 and 9) from the pilot valve (11).



1. Setscrew
2. Air cleaner
3. Pilot valve-to-unloader tube
4. Unloader interconnecting tube
5. Tubing tee
6. Tubing elbow
7. Tubing tee
8. Pilot valve-to-reservoir tube
9. Tube elbow
10. Cap screw
11. Pilot valve
12. Valve bracket
13. Intercooler safety valve
14. Intercooler tube nut
15. Compression sleeve
16. Intercooler assembly
17. Discharge-to-centrifugal unloader tube assembly
18. Tube elbow
19. Intake-to-centrifugal unloader tube assembly
20. Tube nut

Figure 4-11. Air compressor tubes and fittings, exploded view.

(2) Remove the cap screw (10) that secures the pilot valve to the bracket (12) on the compressor; remove the pilot valve.

c. Cleaning and Inspection.

(1) Wipe the exterior of the pilot valve with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680).

(2) Inspect the pilot valve for cracks, damaged threads, and other obvious damage. If the valve is damaged, or if it fails to control compressor pressure, you must replace it.

d. Installation.

(1) Installation is the reverse of removal. Refer to figure 4-11.

(2) After installation, start the engine and allow reservoir pressure to build up, carefully checking the cut-out pressure. Release enough air to cause the compressor to cut in, carefully checking the cut-in pressure. Adjust per subparagraph *a* above if it fails to control in the 140 to 170 psi range.

(3) Use a soap bubble solution to check the system for leaks after installation. Correct any leaks.

4-45. Air Compressor Air Cleaner

Service the air cleaner per paragraph 3-11*c*. Replace damaged parts. If you note damage that requires complete air cleaner replacement, remove the setscrew (1, fig. 4-11) and pull the air cleaner (2) from the intake unloader assembly. Position a new air cleaner in place and tighten the setscrew.

4-46. Air Compressor Intercooler, Piping, and Fittings

a. Removal and Disassembly.

(1) Release pressure from air system before disconnecting piping. Loosen the intercooler tube nuts (14, fig. 4-11) and disengage the ends of the intercooler assembly (16) from the first stage discharge and second stage inlet ports. Remove the compression sleeves (15).

(2) Remove the intercooler safety valve (13) from the second stage inlet port.

(3) Disconnect and remove tubings and fittings as required.

b. Cleaning and Inspection.

(1) Blow dust and dirt from intercooler fins with compressed air. Flush out the interior of the intercooler and all tubing with dry cleaning solvent (fed. spec. P-D-680). Blow compressed air through them to insure they are open.

(2) Inspect the intercooler for cracks, damaged cooling fins, dents, and other damage. Straighten vent cooling fins. Replace a damaged intercooler.

(3) Inspect the tubing for cracks, clogging, dents, restrictions, and other damage; replace damaged tubing.

(4) Inspect the intercooler safety valve for cracks, damaged threads, and for sticking or binding operation. When the valve stem is pulled, it should move freely under restriction of the valve spring. If possible, check the valve using a source of air pressure and a gage of known accuracy. The valve should release at 200 psi. Replace if defective.

c. Reassembly and Installation.

(1) Reassembly and installation is the reverse of removal. Refer to figure 4-11.

(2) After reassembly, start the engine and allow the compressor to build up pressure in the reservoir. Check lines and fittings for leaks using a soap bubble solution. Correct any leaks.

Section XV. LUBRICATING SYSTEM

4-47. Description

a. The lubricating system dispenses engine oil, chassis grease, and gear oil from a three-compartment reservoir. The lubricants are pumped by one of three air-driven lubricant pumps (fig. 2-3) which transfer the lubricants through hoses and piping to the hose reels (fig. 2-4) mounted at the rear of the lubricating and servicing unit.

b. You can control the pumping rate by operating individual air pressure regulators (1, fig. 2-3) mounted on each lubricant pump. When you increase air pressure, you will increase the lubricant pumping rate. Air pressure gages (2) are mounted on lubricant pumps to allow you to preset pressures to known operable pressures.

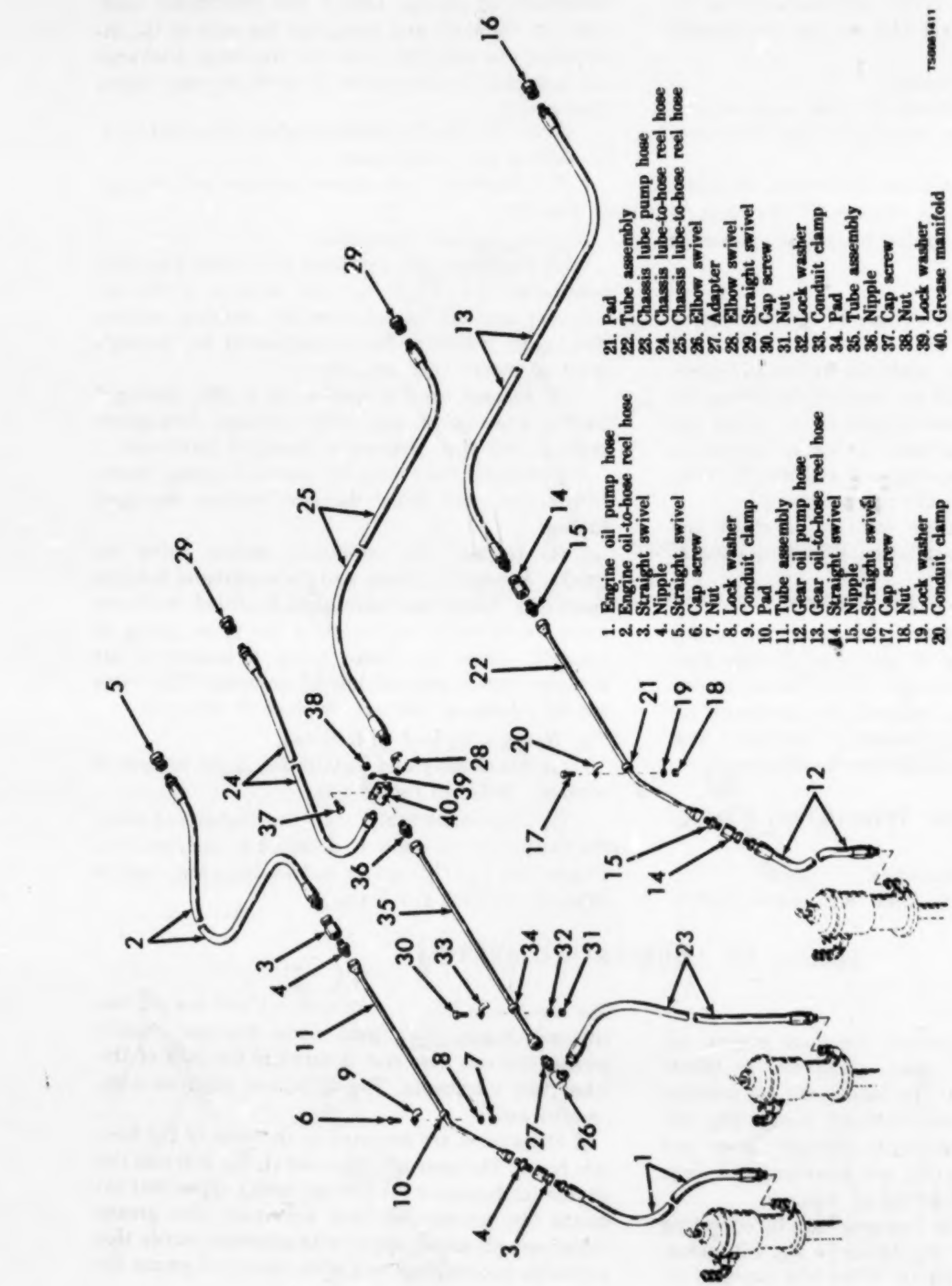
c. Five hose reels are installed on top of the battery box at the rear of the lubricating and servicing unit. The hose reels help you to unwind and rewind the lubricant hoses. Two hose reels dispense chassis grease, and one hose reel is supplied for each of the other two lubricants. The fifth reel supplies compressed air.

d. Dispensers are mounted at the ends of the hose reel hoses. The gear oil dispenser (1, fig. 2-4) and the engine oil dispenser (3) are measuring types that indicate the amount of fluid dispensed. The grease dispensers (2) are equipped with alternate nozzle tips to enable you to adapt to a wide variety of grease fittings.

4-48. Lubricating System Piping

a. Removal and Disassembly.

(1) Remove the engine oil hoses (1 and 2, fig. 4-12) and fittings (3, 4, and 5).



1. Engine oil pump hose
2. Engine oil-to-hose reel hose
3. Straight swivel
4. Nipple
5. Straight swivel
6. Cap screw
7. Nut
8. Lock washer
9. Conduit clamp
10. Pad
11. Tube assembly
12. Gear oil pump hose
13. Gear oil-to-hose reel hose
14. Straight swivel
15. Nipple
16. Straight swivel
17. Cap screw
18. Nut
19. Lock washer
20. Conduit clamp
21. Pad
22. Tube assembly
23. Chassis lube pump hose
24. Chassis lube-to-hose reel hose
25. Chassis lube-to-hose reel hose
26. Elbow swivel
27. Adapter
28. Elbow swivel
29. Straight swivel
30. Cap screw
31. Nut
32. Lock washer
33. Conduit clamp
34. Pad
35. Tube assembly
36. Nipple
37. Cap screw
38. Nut
39. Lock washer
40. Grease manifold

Figure 4-12. Lubricating system lines and fittings, exploded view.

(2) Remove two cap screws (6), nuts (7), lock washers (8), and clamps (9) that secure tube assembly (11) to frame; remove tube assembly.

(3) Remove the gear oil hoses (12 and 13) and fittings (14, 15, and 16).

(4) Remove two cap screws (17), nuts (18), lock washers (19), and clamps (20) that secure tube assembly (22) to frame; remove tube assembly.

(5) Remove the chassis lubricant hoses (23, 24, and 25) and fittings (26, 27, 28, and 29).

(6) Remove two cap screws (30), nuts (31), lock washers (32), and clamps (33) that secure tube assembly (35) to frame; remove tube assembly. Remove nipple (36).

(7) Remove two cap screws (37), nuts (38), and lock washers (39) that secure grease manifold (40) to frame.

b. Cleaning and Inspection.

(1) Wipe the hoses and tubes with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680). Flush the interiors with solvent and blow through them with compressed air to insure that they are clear and free from restrictions. Clean all remaining parts by washing in solvent. Dry thoroughly.

(2) Inspect hoses for cracks, abrasions, fraying, collapsed walls, and damaged threads on hose ends; replace damaged hoses.

(3) Inspect the tube assemblies for clogging, cracked tube ends or tube nuts, dents, restrictions, and other damage; replace damaged tube assemblies.

(4) Inspect all other parts for cracks, distortion, damaged threads and clogging. Replace damaged parts.

c. Reassembly and Installation. Reassembly and installation are the reverse of removal and disassembly. Refer to figure 4-12. After installation, you should check for leaks and make any corrections necessary.

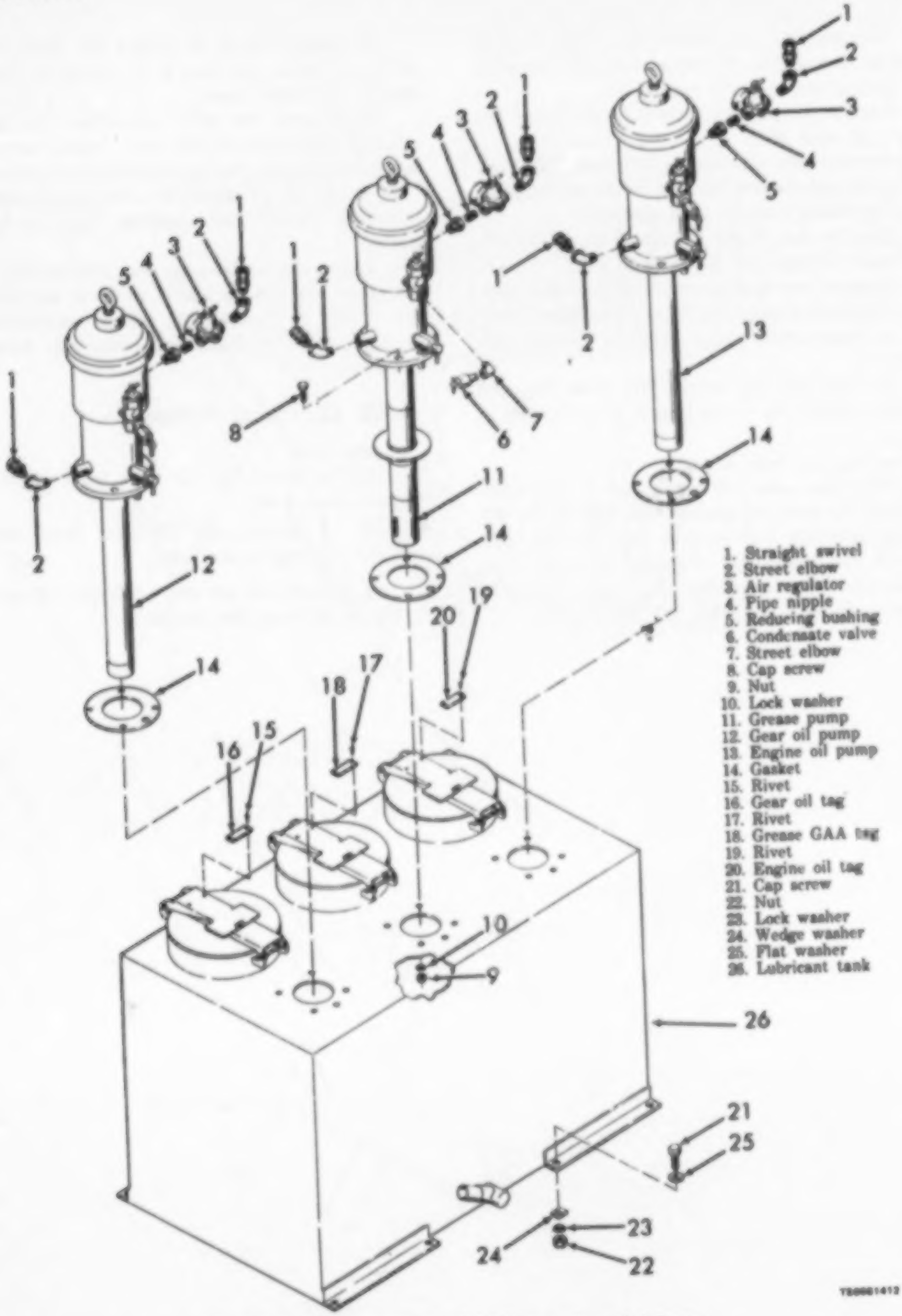
4-49. Lubricant Pumps

a. Removal.

(1) Disconnect the air lines from the lubricant pumps (para 4-40).

(2) Disconnect the lubricant lines from the lubricant pumps (para 4-48).

(3) Remove the air and lubricant fittings (1 and 2, fig. 4-13) from the pumps.



1. Straight swivel
2. Street elbow
3. Air regulator
4. Pipe nipple
5. Reducing bushing
6. Condensate valve
7. Street elbow
8. Cap screw
9. Nut
10. Lock washer
11. Grease pump
12. Gear oil pump
13. Engine oil pump
14. Gasket
15. Rivet
16. Gear oil tag
17. Rivet
18. Grease GAA tag
19. Rivet
20. Engine oil tag
21. Cap screw
22. Nut
23. Lock washer
24. Wedge washer
25. Flat washer
26. Lubricant tank

Figure 4-13. Lubricant pumps and lubricant tank, exploded view.

(4) Remove the air pressure regulators (3) and fittings (4 and 5) from the lubricant pumps. Remove the five cap screws (8), nuts (9), and lock washer that secure the lubricant pumps (11, 12, and 13)

lubricant tank (26); lift out the pumps, allowing residual lubricant to drip into the tank. Remove the gaskets (14).

b. Cleaning and Inspection.

(1) Wash the exterior of the lubricant pumps with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680).

(2) Wipe the exterior of the air pressure regulator with a dry cloth.

(3) Inspect the lubricant pumps for cracks, distortion, and other damage. If damaged, or if the pump had failed to operate, replace it. Refer the defective pump to direct support maintenance for repair.

(4) Inspect the air pressure regulator for a damaged pressure gage, damaged threads, and a hard-to-turn adjusting screw. Check the regulator with an external air source. The unit must control outlet air pressure properly, providing a variable pressure source of air. Replace if damaged.

c. Installation.

(1) Installation is the reverse of removal; refer to figure 4-13.

(2) After installation, start the engine and build up air pressure. Fill the lubricant tank and check the lubricant pumps and air regulators for proper operation.

4-50. Lubricant Tank

a. Removal.

(1) Remove the enclosure from the lubricating and servicing unit (para 4-17*a*).

(2) Completely drain all lubricants from the lubricant tank (26, fig. 4-13). Remove the lubricant pumps from the lubricant tank (para 4-49).

(3) Disconnect the exhaust deflector flexible tubing (6, fig. 4-6) from the piping at the bottom of the lubricant tank.

(4) Wrap a sling around the lubricant tank and support the weight with a hoist. Remove the cap screws (21, fig. 4-13), nuts (22), lock washers (23), wedge washers (24), and flat washers (25) that secure the lubricant tank (26) to the unit. Lift off the lubricant tank.

b. Cleaning and Inspection.

(1) Flush out each of the three lubricant compartments in the tank using dry cleaning solvent (fed. spec. P-D-680). Drain thoroughly.

(2) Inspect the lubricant tank for cracks, defective cover hinges, broken weldments and other damage. Replace a defective tank.

(3) If the tags (16, 18, or 20) are damaged, drill out the rivets (15, 17, and 19) and install new tags.

c. Installation. Installation is the reverse of removal. Refer to figure 4-13.

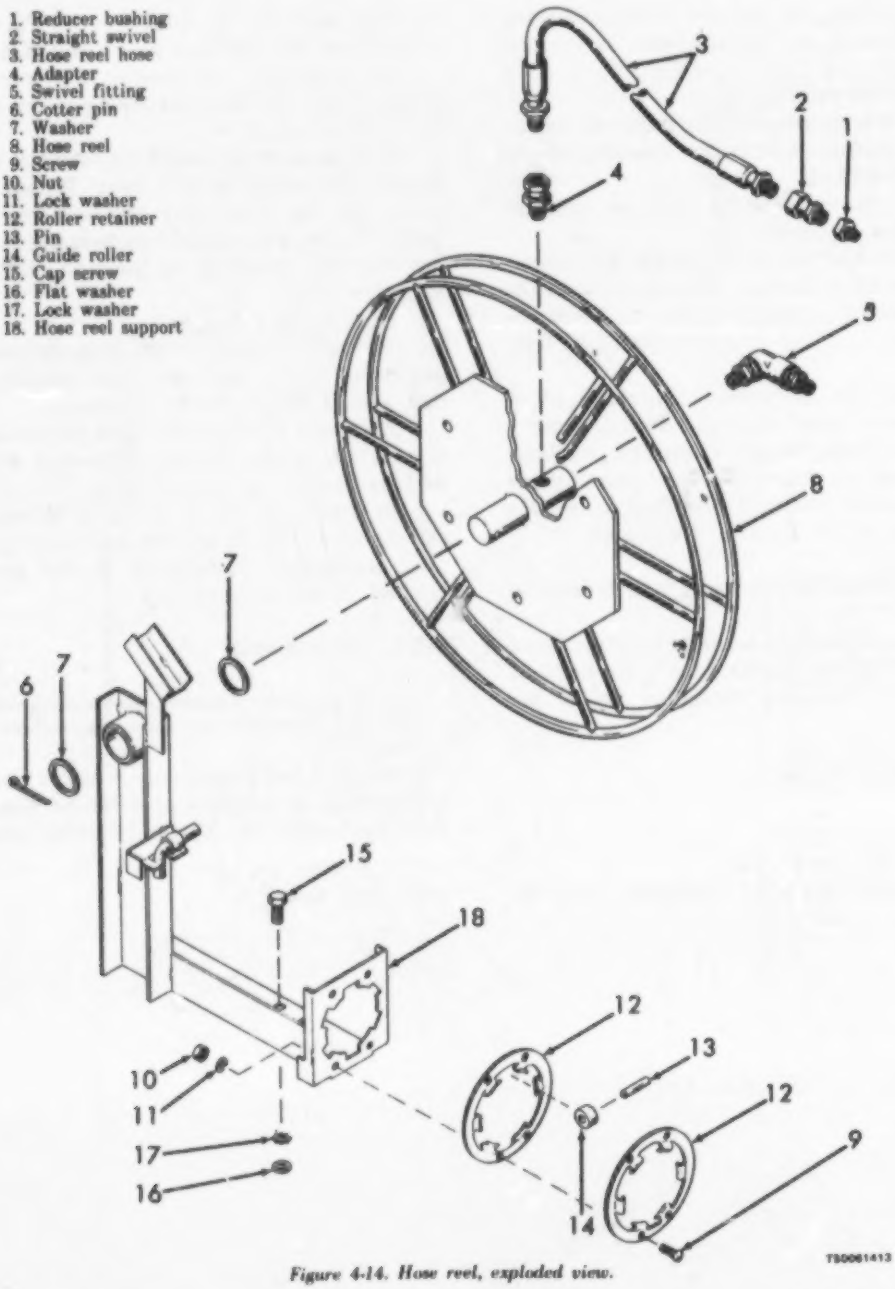
4-51. Hose Reels.

NOTE

All five hose reels are similar in design, so you can use the same disassembly and reassembly procedure for each of them.

a. Removal and Disassembly. You can remove any hose reel as an assembly or it can be disassembled from the battery box by the following procedure.

(1) Remove hose reel hose (3, fig. 4-14) and fittings (1, 2, 4, and 5).



1. Reducer bushing
2. Straight swivel
3. Hose reel hose
4. Adapter
5. Swivel fitting
6. Cotter pin
7. Washer
8. Hose reel
9. Screw
10. Nut
11. Lock washer
12. Roller retainer
13. Pin
14. Guide roller
15. Cap screw
16. Flat washer
17. Lock washer
18. Hose reel support

Figure 4-14. Hose reel, exploded view.

(2) Remove cotter pin (6) that secures hose reel (8) to hose reel support (18); remove hose reel and washers (7).

(3) Disassemble the hose roller guide by removing four screws (9), nuts (10), and lock washers (11) that secure the roller retainers (12) to the support. Remove the six rollers (14) and pins (13).

(4) Remove the hose reel support (18) from battery box by removing screws (15), flat washers (16), and lock washers (17).

b. Cleaning and Inspection.

(1) Wipe the exterior of the hose with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680). Flush out the interior of the hose and blow through it with compressed air to make sure it is free of restrictions.

(2) Wash all remaining parts with solvent; dry thoroughly.

(3) Inspect the hose for cracks, deterioration, abrasion, cuts, fraying, damaged threads on hose ends, collapsed walls, and restrictions. Replace a damaged hose.

(4) Inspect all other parts for cracks, distortion, damaged threads, and other damage; replace damaged parts.

c. Reassembly and Installation.

(1) Reassembly and installation is the reverse of removal and disassembly. Refer to figure 4-14.

(2) After reassembly, start the engine and apply pressure to the lubrication system so that you can check for leaks. Repair any leaks noted.

Section XVI. TRAILER ELECTRICAL SYSTEM

4-52. Description

a. The trailer electrical system is powered through an intervehicle cable connected to the towing vehicle. The system is controlled by switches on the towing vehicle. It includes both a normal lighting system and a blackout system.

b. At the rear of the vehicle are two stop, tail, and directional lights, two blackout stop and tail lights, five normal red-lensed clearance lights, and two blackout clearance lights. Each side of the vehicle has one red and one amber service clearance light and one red and one amber blackout clearance light.

c. The entire system is protected by three circuit breakers, each having a rating of 15 amperes. The circuit breakers are mounted in a junction box at the front of the trailer. A terminal board is installed in the junction box to facilitate electrical distribution.

4-53. Trailer Electrical System Wiring

a. Removal and Disassembly.

(1) Disconnect and remove intervehicular cable (1, fig. 4-15).

1. Intervehicular cable
2. Screw
3. Nut
4. Lock washer
5. Flat washer
6. Receptacle cover
7. Screw
8. Nut
9. Lock washer
10. Flat washer
11. Cable clamp
12. Screw
13. Receptacle cable
14. Stuffing tube
15. Screw
16. Nut
17. Lock washer
18. Flat washer
19. Junction box
20. Screw
21. Nut
22. Lock washer
23. Flat washer
24. Cable clamp
25. Screw
26. Nut
27. Lock washer
28. Flat washer
29. Cable clamp
30. Amber service clearance light
31. Amber blackout clearance light
32. Red service clearance light
33. Red blackout clearance light
34. Screw
35. Nut
36. Lock washer
37. Flat washer
38. Cable clamp
39. Cable clamp
40. Stop and tail light
41. Blackout stop and tail light
42. Wiring harness

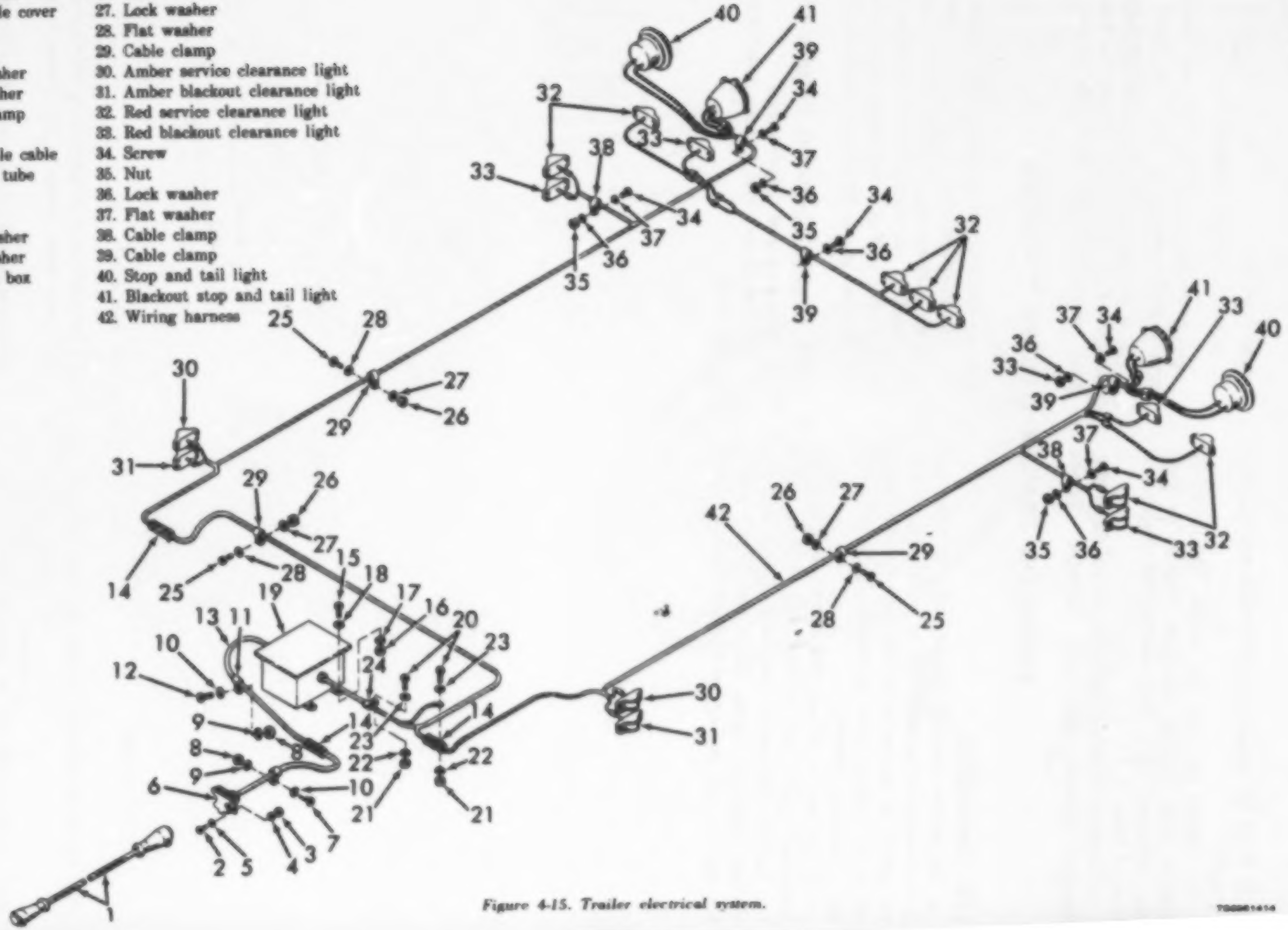


Figure 4-15. Trailer electrical system.

(2) Remove screws (2), nuts (3), lock washers (4), flat washers (5), and receptacle cover (6).

(3) Remove screws (7 and 12), nut (8), lock washer (9), flat washers (10), and clamps (11) that secure the receptacle cable (13) to the trailer. Disconnect and remove the cable.

(4) Remove the junction box (19) by removing the four screws (15), nuts (16), lock washers (17), and flat washers (18).

(5) Disassemble the junction box by removing the eight screws (1, fig. 4-16) that secure the cover (2) and gasket (3) to the junction box (12). Remove the adapter (4) and bushing (5). Disconnect circuit breaker leads and remove circuit breakers (8) by removing screws (6) and lock washers (7). Remove screws (9) and lock washers (10) that secure the terminal board (11) to the junction box (12); remove the terminal board.

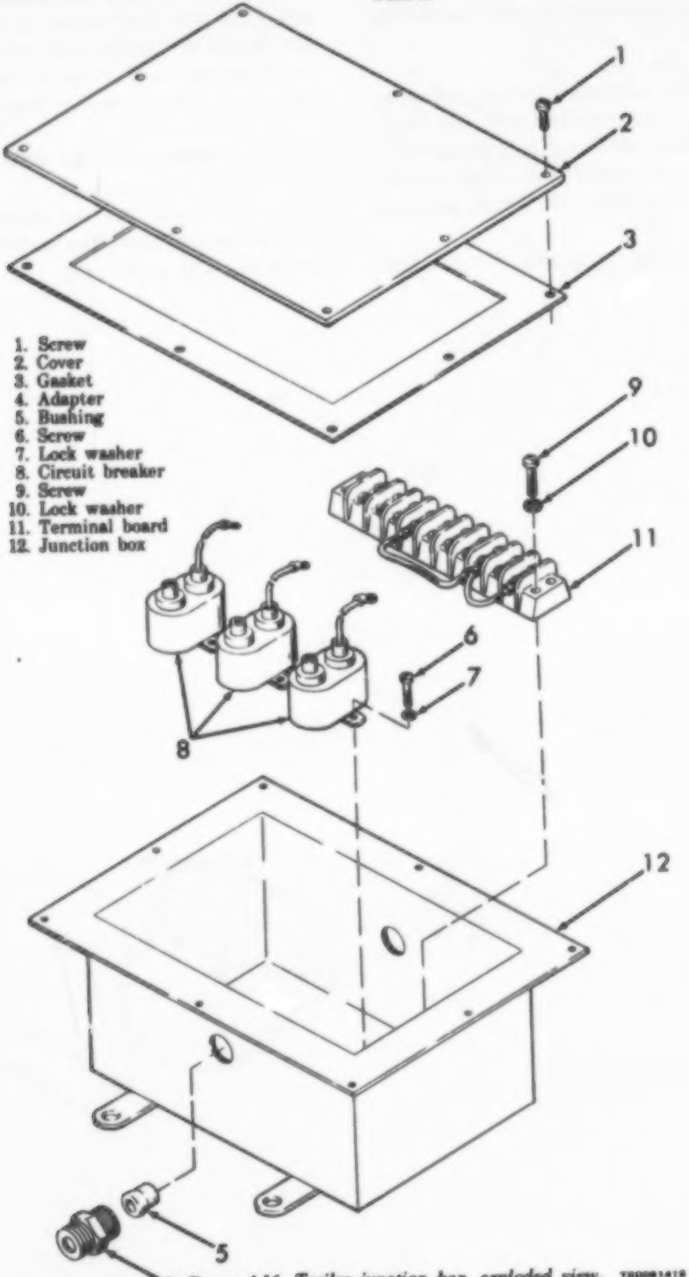


Figure 4-16. Trailer junction box, exploded view. TS00081418

(6) Remove screws (20, 25, and 34, fig. 4-15), nuts (21, 26, and 35), lock washers (22, 27, and 36), flat washers (23, 28, and 37), and cable clamps (24, 29, 38, and 39) that secure the wiring harness (42) to the trailer.

(7) Disconnect and remove the amber service clearance lights (30), amber blackout clearance lights (31), red service clearance lights (32), red blackout clearance lights (33), stop and tail lights (40), and blackout stop and tail lights (41). Remove the wiring harness (42).

b. Cleaning and Inspection.

(1) Clean the wiring harnesses, circuit breakers, and terminal board by wiping with a soft, dry cloth. If necessary, you can wipe off deposits of grease with a cloth lightly dampened with dry cleaning solvent (fed. spec. P-D-680), if you take care not to saturate the leads.

(2) Inspect the wiring harnesses for cracked, abraded, frayed, or deteriorated insulation, brok wires, damaged terminals, and other damage. Cle corroded terminals with fine sandpaper. Repla damaged wiring harnesses.

(3) Inspect circuit breakers for cracks, signs overheating, and damaged leads; replace if defectiv

(4) Inspect all cable clamps for cracks an damage; replace if defective.

c. Reassembly and Installation. Reassembly and in stallation are the reverse of removal and disassem bly. Refer to figures 4-15 and 4-16. Install the ele trical wiring on the trailer. Also refer to the chassi electrical system wiring diagram in figure 1-4.

4-54. Blackout Stop and Tail Light

a. Lamp Replacement.

(1) Remove the six screws (1, fig. 4-17) tha secure the door (2) to the lamp body; remove the door seals (3), and gasket (4).

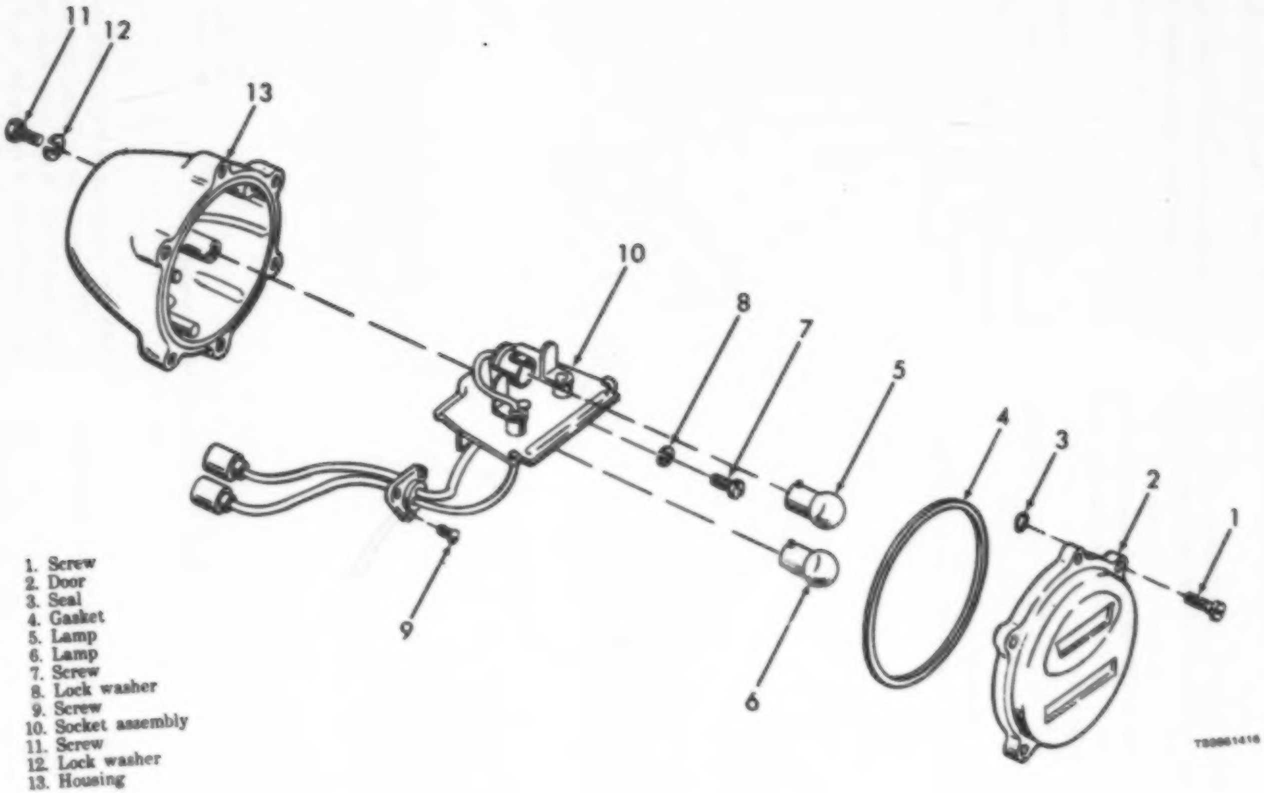


Figure 4-17. Blackout stop and tail light, exploded view.

(2) Press in on the defective lamp (5 or 6) and give it a quarter turn counterclockwise to remove it. Install a new lamp by pressing it into its socket and giving it a quarter turn clockwise.

(3) Replace the door by reversing the removal procedure.

b. Disassembly. Refer to figure 4-17.

(1) Remove lamps (5 and 6) as instructed in subparagraph *a* above.

(2) Remove screws (7 and 9) and lock washer (8) that secure socket assembly (10) to housing (13); remove socket assembly.

(3) Remove housing (13) from trailer frame by removing screw (11) and lock washer (12).

c. Cleaning and Inspection.

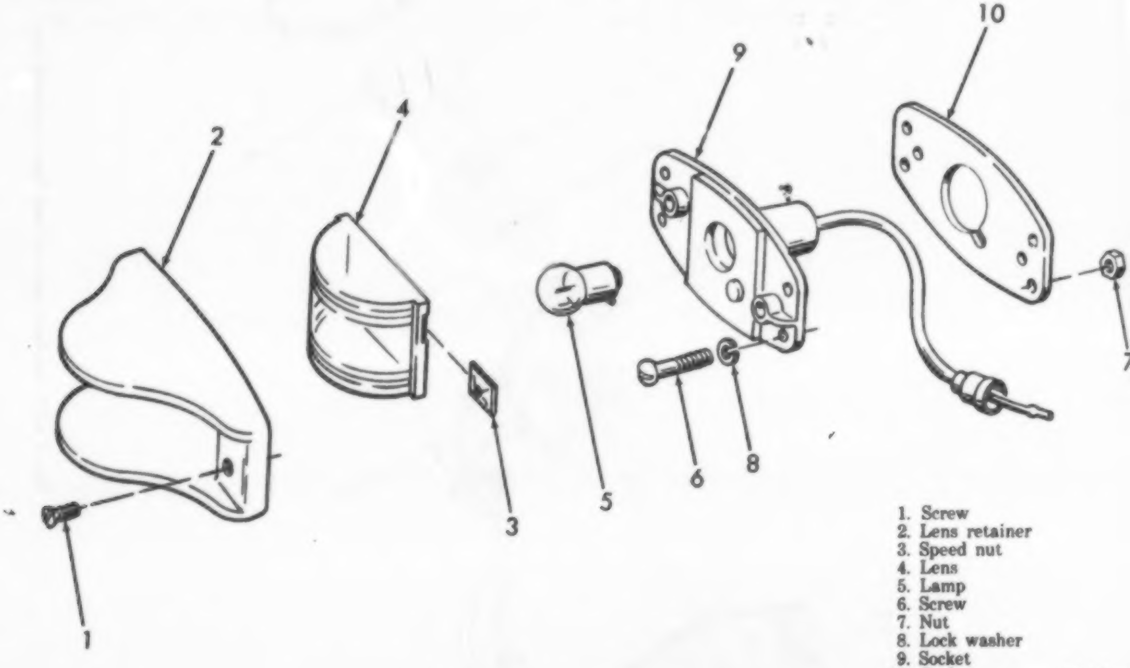
(1) Wipe all parts with a cloth dampened lightly with dry cleaning solvent (fed. spec. P-D-680).

(2) Inspect all parts for cracks, corrosion, damaged electrical leads. Make sure all electrical minals are clean and bright. If necessary, buff th lightly with fine sandpaper. Replace any defect parts.

d. Reassembly. Reassemble the blackout stop tail light in the reverse order of disassembly. Refer figure 4-17.

4-55. Clearance Light

a. Lamp Replacement. Remove the two screws fig. 4-18) and remove the lens retainer (2), lens and speed nut (3). Press in on the lamp (5) and give a quarter turn counterclockwise to remove it. Repla it with a new lamp. Reverse the removal procedure replace the lens.



1. Screw
2. Lens retainer
3. Speed nut
4. Lens
5. Lamp
6. Screw
7. Nut
8. Lock washer
9. Socket
10. Gasket

Figure 4-18. Clearance light, exploded view.

b. Disassembly.

(1) Remove the lamp (5, fig. 4-18) as directed in subparagraph *a* above.

(2) Remove the screws (6), nuts (7), and lock washers (8) and separate the socket (9) and gasket (10).

c. Cleaning and Inspection.

(1) Wipe all parts with a cloth dampened lightly with dry cleaning solvent (fed. spec. P-D-680).

(2) Inspect for cracks, corrosion, and damag electrical leads. Make sure electrical terminals clean and bright. If necessary, buff them lightly w fine sandpaper. Replace any defective parts.

d. Reassembly. To reassemble the clearance lig reverse the disassembly procedure. Refer to figure 18.

Section XVII. WHEELS, TIRES, AND HUBS

4-56. Description

The trailer is mounted on two inner tube type rubber tires. Each tire is mounted on a wheel which is secured to the wheel hub. The hub rides on tapered roller bearings that mount on the axle ends. A brake drum adapter and brake drum are secured to and rotate with the hub.

4-57. Wheel and Tire

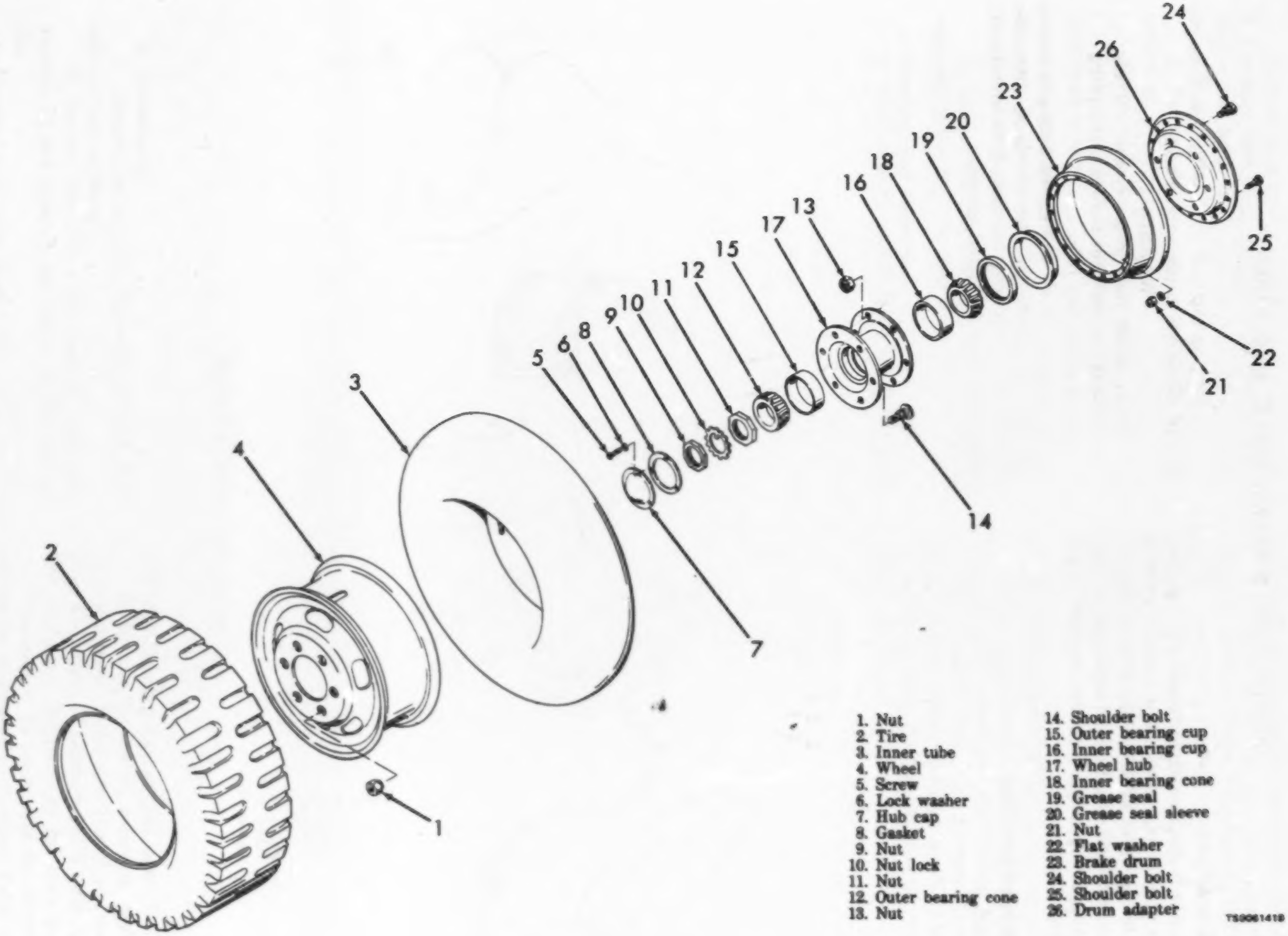
a. Removal.

(1) Jack up the unit to raise the tire from the ground. Block up to prevent lowering.

WARNING

Make sure that you release all air from the inner tube before attempting to remove the tire.

(2) Remove the six nuts (1, fig. 4-19) and remove the assembled tire (2) and wheel (4) from the lubricating and servicing assembly. Note that the left wheel nuts have left-hand threads.



1. Nut
2. Tire
3. Inner tube
4. Wheel
5. Screw
6. Lock washer
7. Hub cap
8. Gasket
9. Nut
10. Nut lock
11. Nut
12. Outer bearing cone
13. Nut
14. Shoulder bolt
15. Outer bearing cup
16. Inner bearing cup
17. Wheel hub
18. Inner bearing cone
19. Grease seal
20. Grease seal sleeve
21. Nut
22. Flat washer
23. Brake drum
24. Shoulder bolt
25. Shoulder bolt
26. Drum adapter

Figure 4-19. Wheel, tire, hub, and drum, exploded view.

(3) Release all air from the inner tube and remove the tire (2) tube (3) from the wheel (4).

b. Cleaning and Inspection.

(1) Clean the tire, tube, and wheel with a pressurized stream of water. Wipe any greasy or gummy deposits from the wheel with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680).

(2) Inspect the tire for cracks, punctures, imbedded foreign materials, cuts, and tears. Remove foreign materials and skive around cuts to prevent them from tearing farther into the sound rubber of the tire.

(3) Inspect the tube for deterioration, cracks, cuts, and leaks. If necessary, partially inflate the tube and immerse it into a container of water to check for leaks. Patch any leaks.

c. Installation. Install the tube (3, fig. 4-19) and tire (2) on the wheel (4) and inflate to 50 psi. Check that the tire retains its pressure. Secure the assembled tire and wheel to the lubricating and servicing assembly with six nuts (1). Lower the jack so that the unit rests on the ground.

4-58. Wheel Hub and Drum.

a. Removal and Disassembly.

(1) Remove the wheel and tire (para 4-57*a*).

(2) Remove the three screws (5, fig. 4-19) and lock washers (6) that secure the hub cap (7) to the wheel hub; remove hub cap and gasket (8).

(3) Bend up the tang of nut lock (10) and remove nut (9) and nut lock. Remove the bearing retaining nut (11).

(4) Remove six nuts (13) and remove the assembled hub with bearings from the axle. Remove the outer and inner bearing cones (12 and 18) from the hub (17). Do not remove the bearing cups (15 and 16) from the hub unless inspection indicates that they are damaged and must be replaced.

(5) Remove the grease seal (19) and grease seal sleeve (20) from the axle.

(6) Disassembly of the brake drum (23) from the adapter (26) is not necessary unless either part is damaged and requires replacement.

b. Cleaning and Inspection.

(1) If the bearings are in good condition and can be reused, place them in a wire basket and flush them up and down in a container of dry cleaning solvent (fed. spec. P-D-680) to remove all caked and hardened grease. If necessary, rap the end sharply against a soft-wood block to dislodge the grease. Air-dry the bearings. If compressed air is used, take care that you do not spin the bearings. After cleaning, dip bearings into a container of clean engine oil and wrap them in lint-free paper to prevent contamination by dust or dirt.

(2) Discard and replace the grease seal (19) each time the hub and drum are disassembled.

(3) Clean all remaining parts with solvent and dry thoroughly.

(4) Inspect the bearing cones for cracks, scored or rough rollers or races, binding or catching operation, or signs of overheating. Replace damaged bearing cones.

NOTE

If either the bearing cones or cups are damaged, you must replace both parts as a matched set. Do not attempt to use new cups with old cones or vice versa.

(5) Inspect the bearing cups in the hub for scoring, roughness, or other damage; if defective, press them out or drive them out using a hammer and soft drift.

(6) Inspect the brake drum for cracks, wear, roughness, out-of-roundness, scoring, or other damage. Turn and grind the inside diameter of the drums if defective.

(7) Check all shoulder bolts for looseness, cracks, and damaged threads. If damaged, drive out the bolts and drive in new ones. If the hole in the hub or drum adapter is enlarged so that tight bolt mounting is not possible, replace the hub or adapter.

(8) Inspect all other parts for cracks, distortion, damaged threads, and other damage; replace damaged parts.

c. Reassembly and Installation.

(1) Reassemble and install the hub and drum in the reverse order of disassembly and removal. Refer to figure 4-19.

(2) If bearing cups (15 and 16) were removed from the hubs (17), press in new bearing cups squarely until they are fully seated in the hubs.

(3) During reassembly, pack the wheel bearings with grease, following recommendations given in L.O. 5-4930-218-12.

(4) To provide proper bearing adjustment, tighten the nut (11) while rotating the wheel. Continue to tighten until a distinct drag on the wheel is felt, then back off the nut just enough to remove the drag. Install the nut lock (10) and outer nut (9), taking care not to upset the adjustment as the second nut is installed. Bend down one tang of the nut lock against a flat of the outer nut to lock the adjustment.

(5) Use a new hub cap gasket (8) when installing the hub cap (7).

(6) Install the wheel and tire (para 4-57*c*).

Section XVIII. TRAILER BRAKE SYSTEM

4-59. Description

a. The trailer brakes are operated by an air-over-hydraulic system. Refer to figure 1-6. A dual system is used so that braking action will still occur even though one section of the system fails. This dual system incorporates one relay valve, two air reservoirs, two air brake chambers, two master cylinders, two brake cylinders in each wheel, and a dual system of brake lines to interconnect each master cylinder with one wheel cylinder at each wheel.

b. The brake system is normally operated by the brake system of the towing vehicle to which you must connect the service and emergency hoses from the trailer brake system. Pressure in the dual air reservoirs is maintained through the emergency hose. When the brake system of the towing vehicle is applied, air pressure is applied to the relay valve through the service hose. This operates the relay valve, causing it to apply pressure to both air brake chambers. When the push rods of the air brake chamber extend, they operate the brake master cylinders to operate the wheel cylinders. The pressure applied to the relay valve through the service hose controls the braking force. When low pressure is applied, light braking occurs. When high pressure is applied, heavy
braking occurs. When pressure is released e
the brakes release.

c. Each brake master cylinder controls one
cylinder at each wheel. This helps to insure th
braking will occur even though one of the dua
systems fails.

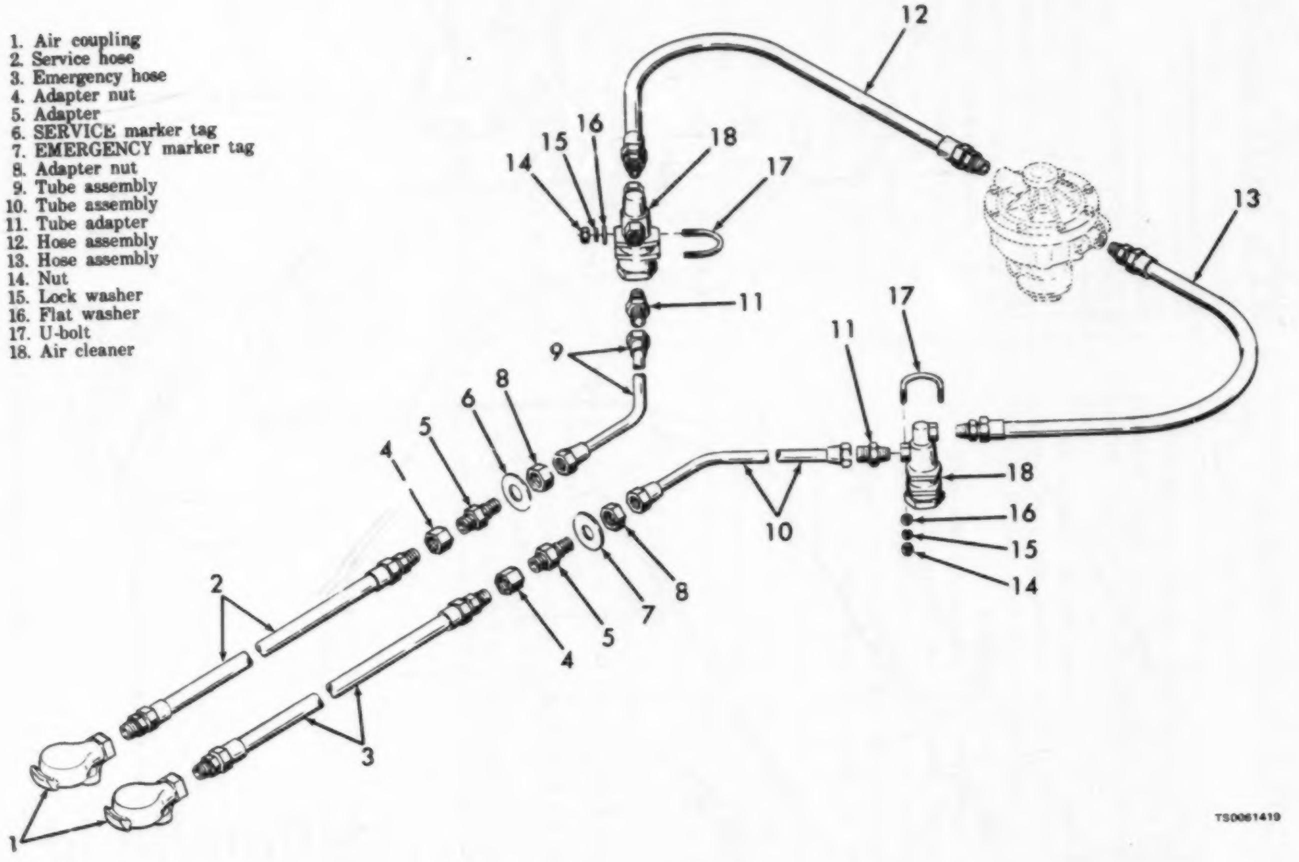
d. In the event that you have a breakaway o
trouble which disconnects the emergency ai
between the towing vehicle and the trailer, th
valve will cause both portions of the dual sys
apply the brakes to bring the trailer to a st

4-60. Brake System Air Lines and Fit

a. Removal. Remove the air lines and fitting
interconnect the lubricating and servicing unit
system components and the towing vehicle as fo

(1) Open the drain cock (13, fig. 4-21) at th
tom of the lower air reservoir (17) to drain a
from the brake air system before disconnecting

(2) Remove the air couplings (1, fig. 4-20



1. Air coupling
2. Service hose
3. Emergency hose
4. Adapter nut
5. Adapter
6. SERVICE marker tag
7. EMERGENCY marker tag
8. Adapter nut
9. Tube assembly
10. Tube assembly
11. Tube adapter
12. Hose assembly
13. Hose assembly
14. Nut
15. Lock washer
16. Flat washer
17. U-bolt
18. Air cleaner

Figure 4-20. Towing vehicle-to-lubricating and servicing unit interconnecting brake lines, exploded view.

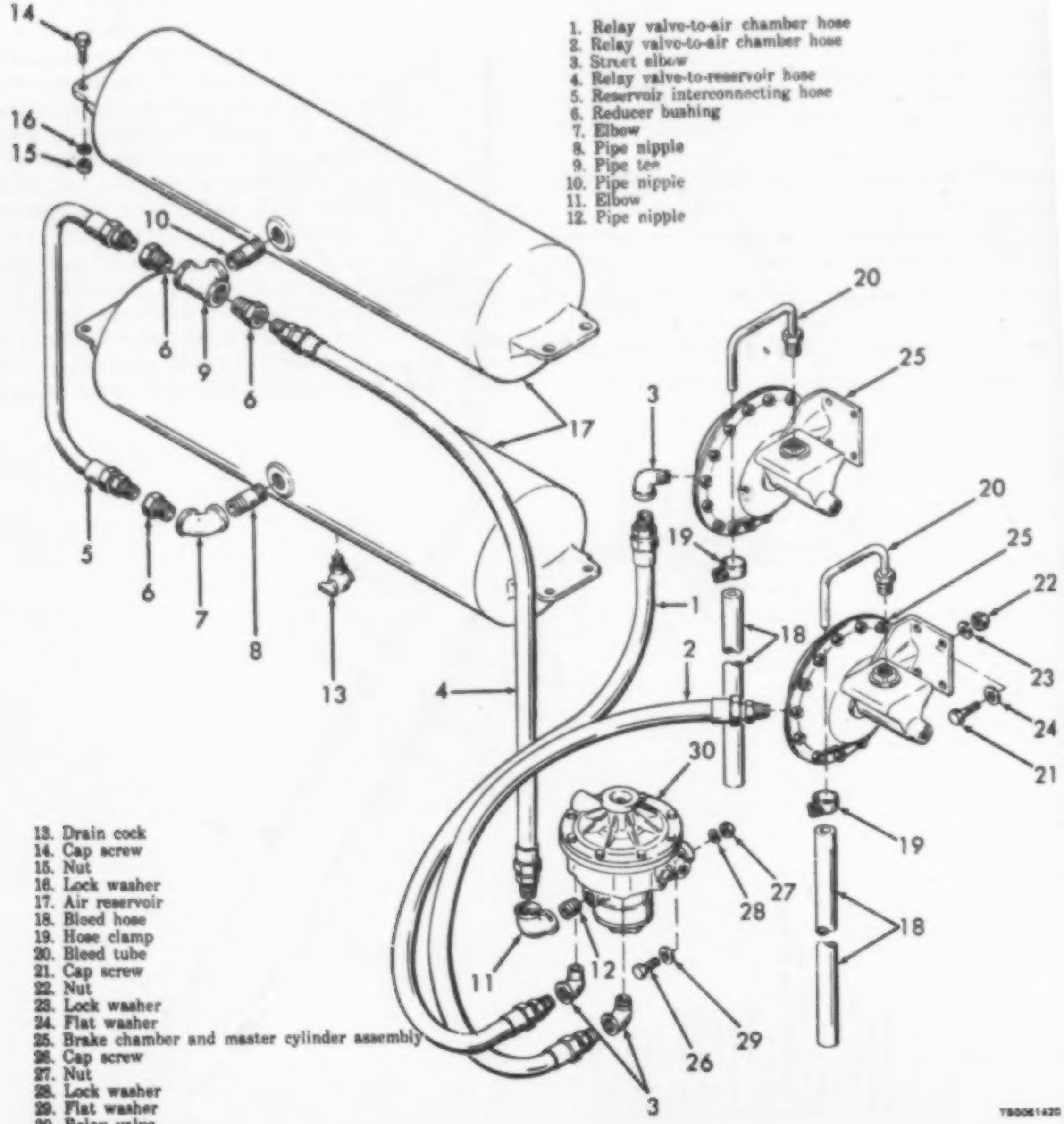
(3) Remove the service hose (2), emergency hose (3), fittings (4 and 5), tags (6 and 7), and nuts (8).

(4) Remove tube assemblies (9 and 10) and adapters (11).

(5) Remove hose assemblies (12 and 13).

(6) Remove the nuts (14), lock washers (15), fla washers (16), and U-bolts (17) that secure the ai cleaners (18) to the trailer.

(7) Remove the relay valve-to-air chamber hose (1 and 2, fig. 4-21) and elbows (3).



1. Relay valve-to-air chamber hose
2. Relay valve-to-air chamber hose
3. Street elbow
4. Relay valve-to-reservoir hose
5. Reservoir interconnecting hose
6. Reducer bushing
7. Elbow
8. Pipe nipple
9. Pipe tee
10. Pipe nipple
11. Elbow
12. Pipe nipple
13. Drain cock
14. Cap screw
15. Nut
16. Lock washer
17. Air reservoir
18. Bleed hose
19. Hose clamp
20. Bleed tube
21. Cap screw
22. Nut
23. Lock washer
24. Flat washer
25. Brake chamber and master cylinder assembly
26. Cap screw
27. Nut
28. Lock washer
29. Flat washer
30. Relay valve

Figure 4-21. Brake system air components, exploded view.

(8) Remove the relay valve-to-reservoir hose (4) and fittings (6, 11, and 12).

(9) Remove the reservoir interconnecting hose (5) and fittings (6 through 10).

b. Cleaning and Inspection.

(1) Wipe the exterior of the hoses with a clo dampened lightly with dry cleaning solvent (fe spec. P-D-680). Flush solvent through the lines a

blow them clear with compressed air. Wash all fittings in solvent.

(2) Inspect hoses for cracks, abrasions, deterioration, fraying, collapsed walls, and damaged threads on hose ends. Replace defective hoses.

(3) Inspect all fittings for cracks, damaged threads, corrosion, and other damage; replace damaged fittings.

c. Installation.

(1) Install the air lines and fittings that interconnect the brake system air components in the reverse order of removal. Refer to figure 4-21.

WARNING

Be sure that you install the SERVICE and EMERGENCY intervehicular air lines correctly. SERVICE connections terminate on the right side; EMERGENCY on the left. Check that they connect to the properly marked ports on the relay valve (30). If hoses are improperly connected, the brake system will fail.

(2) Install the air lines and fittings that interconnect the towing unit with the lubricating and servicing unit in the reverse order of removal. Refer to figure 4-20.

(3) After reassembly, check out the air brake system to assure its proper operation by connecting it to a towing vehicle and applying pressure to the system. Operate the brake controls on the towing vehicle. Check the system for leaks with a soap bubble solution. Correct any leaks.

4-61. Brake System Air Reservoirs

a. Removal (fig. 4-21).

(1) Open the drain cock (13) at the bottom of the lower air reservoir (17) to release all air from the brake system.

(2) Disconnect air hoses (4 and 5) and remove hose (5) and fittings (6 through 10).

(3) Remove the four cap screws (14), nuts (15), and lock washers (16) that secure each of the air reservoirs to the front plate; remove the air reservoirs.

b. Cleaning and Inspection.

(1) Wipe the exterior of the air reservoirs with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680). Flush the interiors of the tanks with solvent. Continue to rinse until clear solvent runs out.

(2) Inspect the air reservoirs for cracks, dents, broken mounting bracket weldments, and other damage. Replace a defective air reservoir.

WARNING

The air reservoirs are subjected to high air pressures that can rupture an improperly repaired or welded tank. You must replace the reservoir if it is defective. No repairs are authorized.

c. Installation. Installation is the reverse of removal. Refer to figure 4-21. After installation, build up pressure in the air system and check for leaks using a soap bubble solution.

4-62. Air Chamber

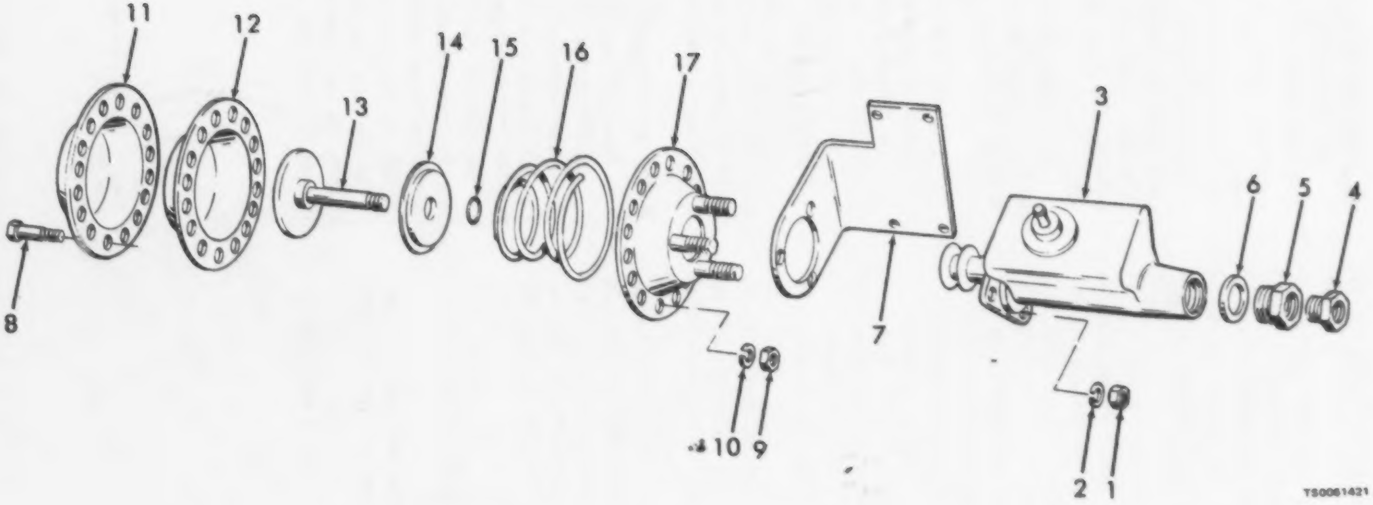
a. Removal and Disassembly.

(1) Disconnect the air lines (1 and 2, fig. 4-21) to the brake chambers.

(2) Disconnect the hydraulic lines from the master cylinder (para 4-66*a*).

(3) Remove the four cap screws (21, fig. 4-21), nuts (22), lock washers (23), and flat washers (24) that secure the brake chamber and master cylinder assembly (25) to the front plate; remove the assembly.

(4) Remove the three nuts (1, fig. 4-22) and lock washers (2) and separate the master cylinder (3) and bracket (7) from the assembled air chamber.



1. Nut
2. Lock washer
3. Master cylinder
4. Connector
5. Reducing bushing
6. Gasket
7. Bracket
8. Screw
9. Nut
10. Lock washer
11. Back plate
12. Diaphragm
13. Push rod
14. Spring guide
15. Grommet
16. Spring
17. Front plate

Figure 4-22. Air chamber, exploded view.

(5) Disassemble the air chamber, by loosening the nuts (9) alternately and in increments to relieve the tension of the spring (16). Disassemble the back plate (11), diaphragm (12), push rod (13), spring guide (14), grommet (15), and spring (16) from the front plate (17).

b. Cleaning and Inspection.

(1) Clean the metallic parts of the brake chamber with dry cleaning solvent (fed. spec. P-D-680). Wash the diaphragm with a detergent and water solution.

(2) Inspect the diaphragm for cracks, deterioration, wear, and worn area at the push rod contact point. Replace a damaged diaphragm.

(3) Inspect the covers for cracks, dents, distortion, and damaged threads; replace a damaged cover.

(4) Inspect the spring for rust, distortion, and for loss of tension. Replace a damaged spring.

(5) Inspect the master cylinder for obvious damage. If necessary, disassemble and repair it per paragraph 4-64.

c. Reassembly and Installation.

(1) Reassembly of the brake chamber and master cylinder assembly is the reverse of disassembly. Refer to figure 4-22. You must be careful to tighten the nuts (9) on the screws (8) evenly and alternately to prevent the diaphragm from puckering between the flanges of the plates.

(2) Install the assembled brake chamber and master cylinder assembly on the front plate of the lubricating and servicing unit as shown in figure 4-21. Make the necessary air connections. Make the hydraulic connections as shown in figure 4-26. Check the operation by connecting the brake system to that of a towing vehicle and operating the brakes. Check for leaks with a soap bubble solution. Correct any leaks.

4-63. Brake Relay Valve

a. Removal.

(1) Open the drain cock (13, fig. 4-21) at the bottom of the lower air reservoir (17) to drain system. Disconnect the air hoses from the relay valve (para 4-60*a*). Tag hoses to facilitate reassembly.

(2) Remove the cap screws (26, fig. 4-21), nuts (27), lock washers (28), and flat washers (29) that secure the brake relay valve (30) to the front plate of the lubricating and servicing unit; remove the relay valve.

(3) Refer the defective relay valve to direct support maintenance for repair.

b. Installation. Installation is the reverse of removal. Refer to figures 4-20 and 4-21. Take care that hoses are connected correctly. If you connect any hoses improperly, the brake system will fail.

4-64. Brake Master Cylinder

a. Removal and Disassembly.

(1) Remove the brake master cylinder (para 4-62*a*).

(2) Pour the brake fluid from the master cylinder.

(3) The master cylinder is spring loaded, and you must take care when removing the retaining ring (1, fig. 4-23).

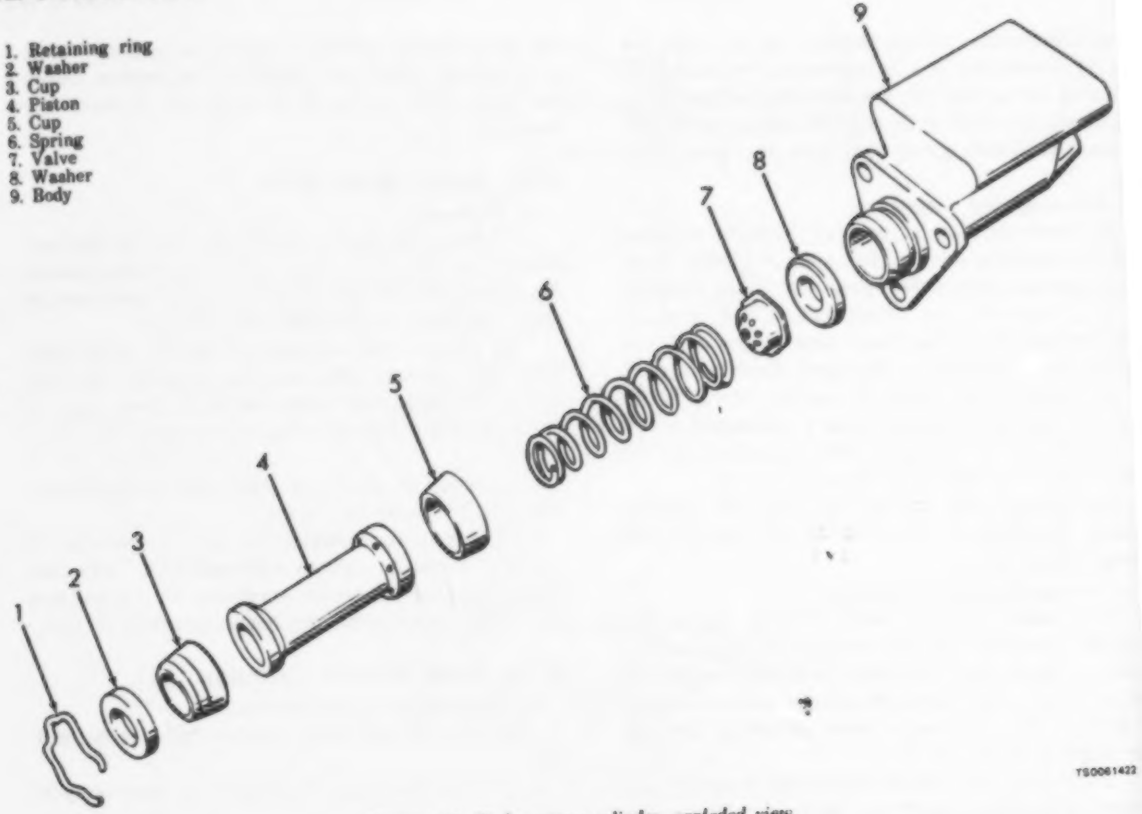


Figure 4-23. Brake master cylinder, exploded view.

(4) Disassemble the master cylinder by removing the washer (2), cups (3 and 5), piston (4), spring (6), valve (7), and washer (8) from the body (9).

b. Cleaning and Inspection.

(1) Discard and replace all non-metallic parts of the master cylinder. Clean all remaining parts with dry cleaning solvent (fed. spec. P-D-680); dry thoroughly.

(2) Inspect the piston (4) for scoring and clogged ports. Open clogged ports, taking care not to enlarge the openings. Replace a scored piston.

(3) Inspect the body (9) for cracks and damaged threads. Inspect the body bore for scoring. Hone or replace the body if the bore is damaged. Replace the master cylinder if the body cannot be repaired.

(4) Inspect the spring for cracks and distortio
Replace a defective spring.

c. Reassembly and Installation.

(1) Reassembly of the master cylinder is th
reverse of disassembly. Refer to figure 4-23.

(2) Assemble the master cylinder to the air cham
ber (para 4-62*c*).

(3) Install the air chamber and master cylind
assembly as shown in figure 4-21.

4-65. Wheel Brake

a. Adjustment. Wear of the brake linings (34, fi
4-25) may prevent the linings from engaging t
brake drums (3, fig. 4-24) with the required for
necessary for effective braking. When wear occu
you must adjust the brakes. Proceed as follows:

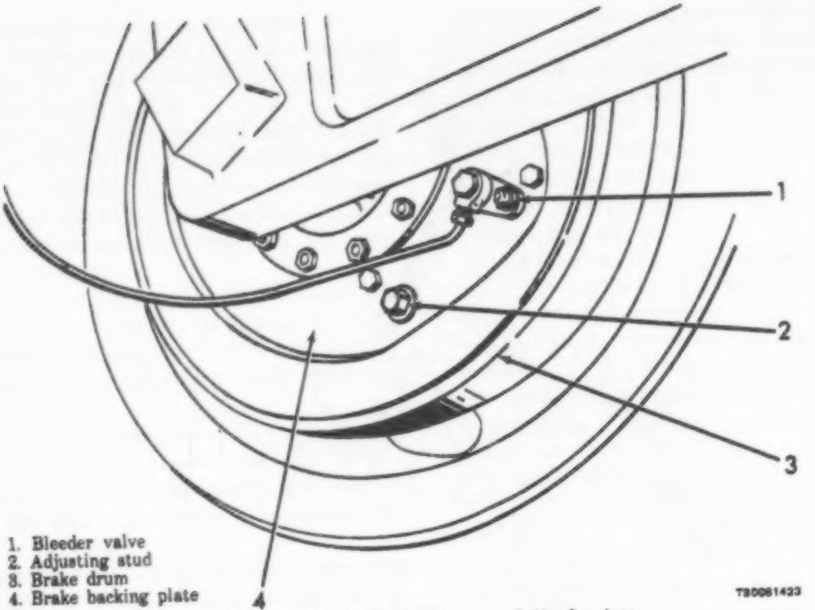


Figure 4-24. Brake adjustment and bleed points.

(1) Jack up the wheel and block under the frame so that the wheel is off the ground.

(2) Rotate the wheel and, while it is rotating, turn the adjusting stud (2, fig. 4-24) counterclockwise until the brake starts to drag against the drum, slowing the rotation of the wheel. Back off the adjusting stud to relieve the drag.

(3) Rotate the wheel again and turn the second adjusting stud counterclockwise until the brake starts to drag against the drum, slowing the rotation of the wheel. Back off the adjusting stud just enough to relieve the drag.

(4) Repeat the procedure on the opposite wheel.

b. *Bleeding.*

(1) *General.* You will have to bleed air from hydraulic portion of service brakes if the system is opened or a component of the system has been replaced.

(2) *Manual bleeding.*

(*a*) Connect trailer service brake hoses to a towing vehicle for manual bleeding as the brake pedal must be pressed and released to actuate the system. You must keep the master cylinder full of brake fluid or air will enter the system.

(*b*) Clean the bleeder valve (1, fig. 4-24) with a clean cloth. Attach a tube to the bleeder valve and place other end of tube in a suitable container.

(*c*) Fill the master cylinder with brake fluid. Refer to LO 5-4930-218-12.

(*d*) Pump brake pedal on towing vehicle until pressure is applied. Hold pedal pressure and open bleeder valve until pressure is released on pedal, then close valve.

(*e*) Repeat action until fluid has replaced air in system, then close valve; remove hose.

(*f*) Refill master cylinder with brake fluid.

(*g*) Repeat the above operation on the other wheel cylinders.

CAUTION

Maintain a high level of fluid in the master cylinder while bleeding each wheel cylinder.

(3) *Pressure feed filler bleeding.*

(*a*) Remove the drain tube from the master cylinder.

(*b*) Connect the hose to pressure feed filler, with the proper size adapter, to the opening of the master cylinder.

(*c*) The filler should contain from 10 to 20 psi air pressure and sufficient fluid to maintain constant fluid level in the master cylinder.

(*d*) Bleed the system as in manual bleeding, subparagraph (2) above.

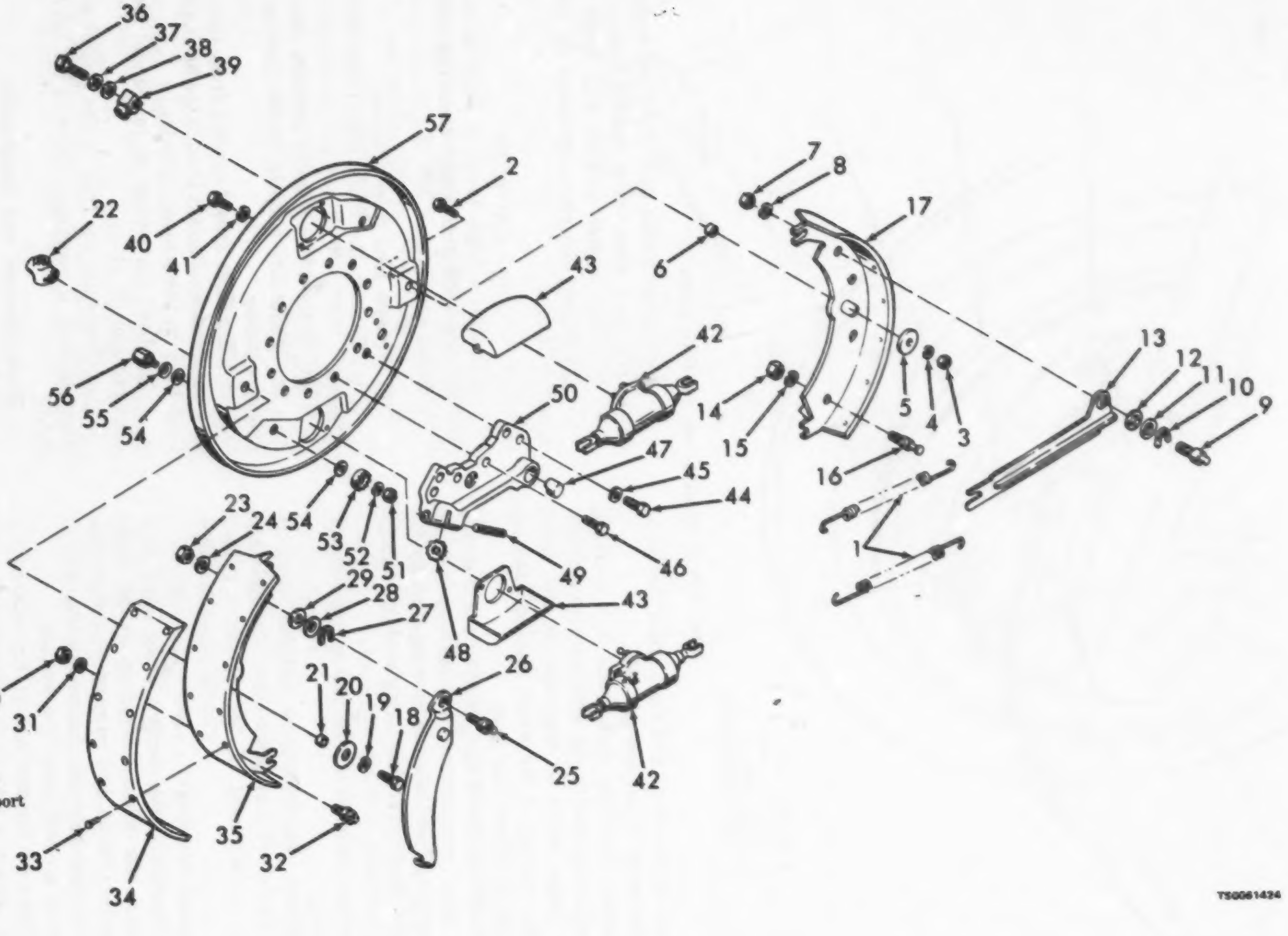
(*e*) Replenish the fluid in the master cylinder after bleeding, if necessary. Refer to the LO 5-4930-218-12.

c. *Brake Removal and Disassembly.*

(1) Remove the wheel and tire (para 4-57).

(2) Remove the wheel hub and drum (para 4-58).

(3) The wheel brake can be removed as an assembly or it can be disassembled while on the vehicle. To remove it as an assembly, disconnect the hydraulic lines to the wheel cylinder (42, fig. 4-25) and remove the cap screws (46) that secure the backing plate (57) to the axle.



1. Return spring
2. Cap screw
3. Nut
4. Lock washer
5. Retainer washer
6. Sleeve
7. Nut
8. Lock washer
9. Pin
10. C-washer
11. Plain washer
12. Spring washer
13. Link
14. Nut
15. Lock washer
16. Pin
17. Brake shoe
18. Cap screw
19. Lock washer
20. Flat washer
21. Sleeve
22. Fitting
23. Nut
24. Lock washer
25. Pivot pin
26. Lever
27. C-washer
28. Plain washer
29. Spring washer
30. Nut
31. Lock washer
32. Pin
33. Rivet
34. Brake lining
35. Brake shoe
36. Fitting bolt
37. Gasket
38. Gasket
39. Inlet fitting
40. Cap screw
41. Lock washer
42. Wheel cylinder
43. Cover
44. Cap screw
45. Lock washer
46. Cap screw
47. Anchor pin
48. Star wheel
49. Adjusting screw
50. Brake shoe support
51. Nut
52. Lock washer
53. Adjusting gear
54. Flat washer
55. Spring washer
56. Adjusting stud
57. Backing plate

Figure 4-25. Wheel brake, exploded view.

(4) Remove return springs (1, fig. 4-25).

(5) Remove cap screw (2), nut (3), lock washer (4), retainer washer (5), and sleeve (6). Remove the assembled brake shoe and link.

(6) Disassemble the brake shoe (17) and link (13) by removing nuts (7 and 14), lock washers (8 and 15), pins (9 and 16), C-washer (10), plain washer (11), and spring washer (12). Do not remove the brake linings (34) unless inspection indicates that they are worn and must be replaced.

(7) Remove the cap screw (18), lock washer (19), flat washer (20), sleeve (21), and fitting (22) that secure the remaining brake shoe (35) to the backing plate (57). Remove the assembled brake shoe and lever (26).

(8) Disassemble the brake shoe (35) and lever (26) by removing nut (23), lock washer (24), pin (25), C-washer (27), plain washer (28), and spring washer (29). Remove nut (30), lock washer (31), and pin (32) from the brake shoe (35).

(9) Remove the wheel cylinders (42) by removing fitting bolts (36), gaskets (37 and 38), fitting (39), cap screws (40), and lock washers (41) that secure the cylinders to the backing plate (57). Remove covers (43).

(10) Remove the brake shoe support (50) by removing cap screws (44 and 46) and lock washer (45). Remove the anchor pin (47) if damaged.

(11) Remove the nut (51), lock washer (52), adjusting gear (53), flat washer (54), spring washer (55), and adjusting stud (56) from the backing plate (57).

d. Cleaning and Inspection.

(1) Wire-brush the brake shoes (17 and 35) to remove all dust and rust. Wipe the exterior of the wheel cylinders with a cloth dampened with dry cleaning solvent (fed. spec. P-D-680). Wash all metallic parts with solvent. Do not saturate the brake linings with solvent.

(2) Inspect the brake shoes for cracks, worn or oil-soaked linings, and wear at pivot points. If linings are worn so that the outside diameter is within 1/16 inch of the rivet heads, replace either the linings or the shoe assemblies. To replace linings, it is necessary to drill out rivets (33) to remove the old linings. When installing new rivets, start at the center of the shoe and work outward toward the ends of the shoe. Linings must fit tightly against the shoe without any gaps.

(3) Inspect the wheel cylinders (42) for cracks, leaking, worn ends, and damaged threads. Replace defective wheel cylinders.

(4) Inspect the brake link (13) and lever (26) for cracks, wear, and distortion. Replace damaged parts.

(5) Inspect all remaining parts for cracks, distortion, damaged threads, and other damage; replace defective parts.

e. Reassembly and Installation.

(1) Reassembly and installation are essentially the reverse of removal and disassembly. Refer to figure 4-25. When assembled, make sure the adjusting gear (53) engages the star wheel (48) and rotates it properly to provide brake adjustment.

(2) Install the hub and drum (para 4-58) and install the wheel and tire (para 4-57).

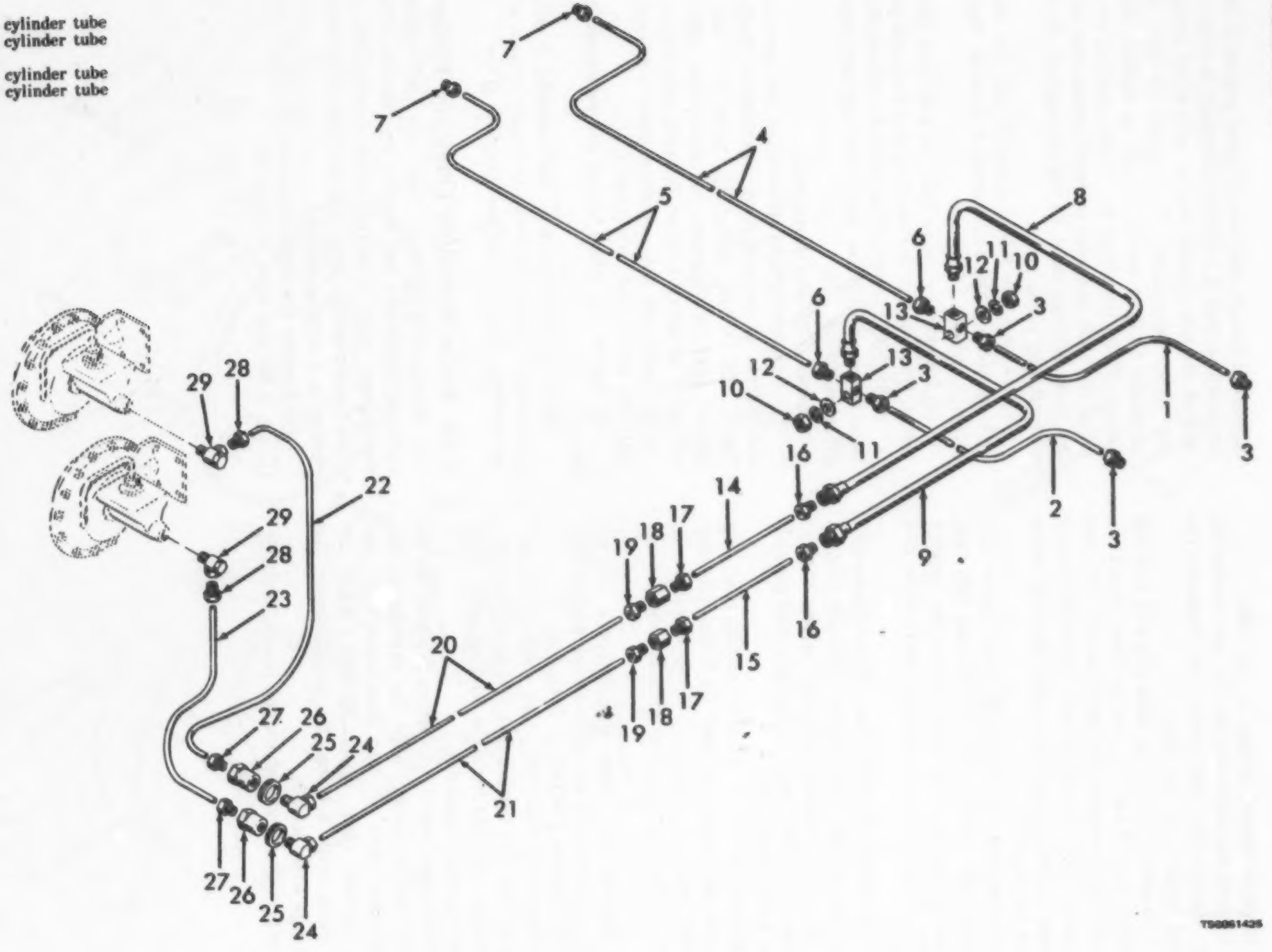
(3) Adjust the wheel brakes per subparagraph *a* above.

(4) If the wheel cylinder was removed, it will be necessary to bleed the brake hydraulic system after reassembly. Refer to subparagraph *b* above.

4-66. Brake Hydraulic Lines and Fittings

a. Removal. Note that there are two separate systems. Disconnect and remove only the lines from the system which requires repair. Instructions are given for one system only. You can remove the second system in a similar manner.

(1) Remove the manifold-to-wheel cylinder tube (1, fig. 4-26) and tube fittings (3).



1. Manifold-to-wheel cylinder tube
2. Manifold-to-wheel cylinder tube
3. Tube fitting
4. Manifold-to-wheel cylinder tube
5. Manifold-to-wheel cylinder tube
6. Tube fitting
7. Tube fitting
8. Hose assembly
9. Hose assembly
10. Nut
11. Lock washer
12. Flat washer
13. Manifold
14. Tube
15. Tube
16. Tube fitting
17. Tube fitting
18. Adapter nut
19. Tube fitting
20. Tube
21. Tube
22. Tube
23. Tube
24. Tube elbow
25. Grommet
26. Adapter
27. Tube fitting
28. Tube fitting
29. Adapter elbow

Figure 4-26. Brake hydraulic lines and fittings, exploded view.

(2) Remove the manifold-to-wheel cylinder tube (4) and tube fittings (6 and 7).

(3) Remove hose assembly (8).

(4) Remove manifold (13) from the axle by removing nut (10), lock washer (11), and flat washer (12).

(5) Remove tube (14), fittings (16 and 17), and adapter nut (18).

(6) Remove tube (20) and fitting (19).

(7) Remove tube (22) and fittings (27 and 28).

(8) Remove the grommet (25).

b. Cleaning and Inspection.

(1) Wipe the exterior of the hoses with a cloth dampened lightly with dry cleaning solvent (fed. spec. P-D-680). Flush out all tubes with cleaning solvent and thoroughly wash all fittings. Blow compressed air through tubes and hoses to insure that they are not restricted.

(2) Inspect hoses for cracks, abrasions, collapsed walls, fraying, deterioration of rubber, and damaged ends. Replace defective hoses.

(3) Inspect tubes for cracks, dents, restrictions, and other damage; replace damaged tubes.

(4) Inspect all fittings for damaged threads, cracks, and other damage. Replace defective fittings.

c. Installation. Install the brake hydraulic lines in reverse order of removal. Refer to figure 4-26. After installation of lines, bleed the system per paragraph 4-65*b*.

Section XIX. FENDERS, SHOCK ABSORBERS, SPRINGS, AND MISCELLANEOUS FRAME PARTS

4-67. Description

a. Two fenders are installed to prevent water and mud from being thrown up from the wheels. The welded steel fenders are bolted to the frame.

b. Shock absorbers are mounted between the axle and frame to reduce shock caused by hitting chuckholes and road bumps, and to dampen oscillation which would otherwise result from spring action.

c. One end of each quarter ellipse spring is secured to the frame; the other end bears against a resilient rubber wear pad on the axle. The weight of the lubricating and servicing unit is loaded against the springs as the axle pivots in its bushings on the frame. In this manner, the springs provide a cushion for the unit, minimizing road shock and bumps.

d. A catwalk is provided to facilitate access to the lubricant pumps. The catwalk is bolted onto the frame.

e. A lunette is installed at the front of the frame, along with safety chains for use when towing the unit. Reflectors are provided to increase unit visibility at night. Six lifting and tiedown rings are installed on the unit to facilitate hoisting, handling, and shipping.

f. A landing gear is installed on the towbar to support the front of the unit when the unit is disconnected from the towing vehicle. It is also used to raise or lower the front of the unit to aline the lunette with the hitch of the towing vehicle. The landing gear is equipped with a pivot to swing it up and out of the way to increase ground clearance during towing.

4-68. Fenders

a. Removal. Remove the wheel chocks (22, fig. 4-27) from the fenders (30). Support the weight of the fenders with a hoist. Remove attaching parts (26 through 29) and remove the fenders.

1. Lube fitting
2. Cotter pin
3. Slotted nut
4. Flat washer
5. Lunette
6. Cap screw
7. Nut
8. Lock washer
9. Flat washer
10. Safety chain
11. Lifting eye
12. Name plate
13. Screw
14. Clip
15. Screw
16. Nut
17. Lock washer
18. Flat washer
19. Amber reflector
20. Red reflector
21. Name plate
22. Wheel chocks
23. T-bolt
24. Chain
25. Safety stand
26. Cap screw
27. Lock washer
28. Cap screw
29. Lock washer
30. Fender
31. Cap screw
32. Nut
33. Flat washer
34. Catwalk
35. Nut
36. Lock washer
37. Flat washer
38. Nut
39. Lock washer
40. Flat washer
41. Shock absorber
42. Flat washer
43. Nut
44. Lock washer
45. Stud
46. Stud
47. Flat washer
48. Bolt
49. Nut
50. Lock washer
51. Keeper plate
52. Spacer
53. Wear pad
54. Lock nut
55. Nut
56. Lock washer
57. U-bolt
58. Spring clamp
59. Spring assembly
60. Cap screw
61. Lock washer
62. Spring bumper
63. Nut
64. Washer
65. Washer
66. Landing gear

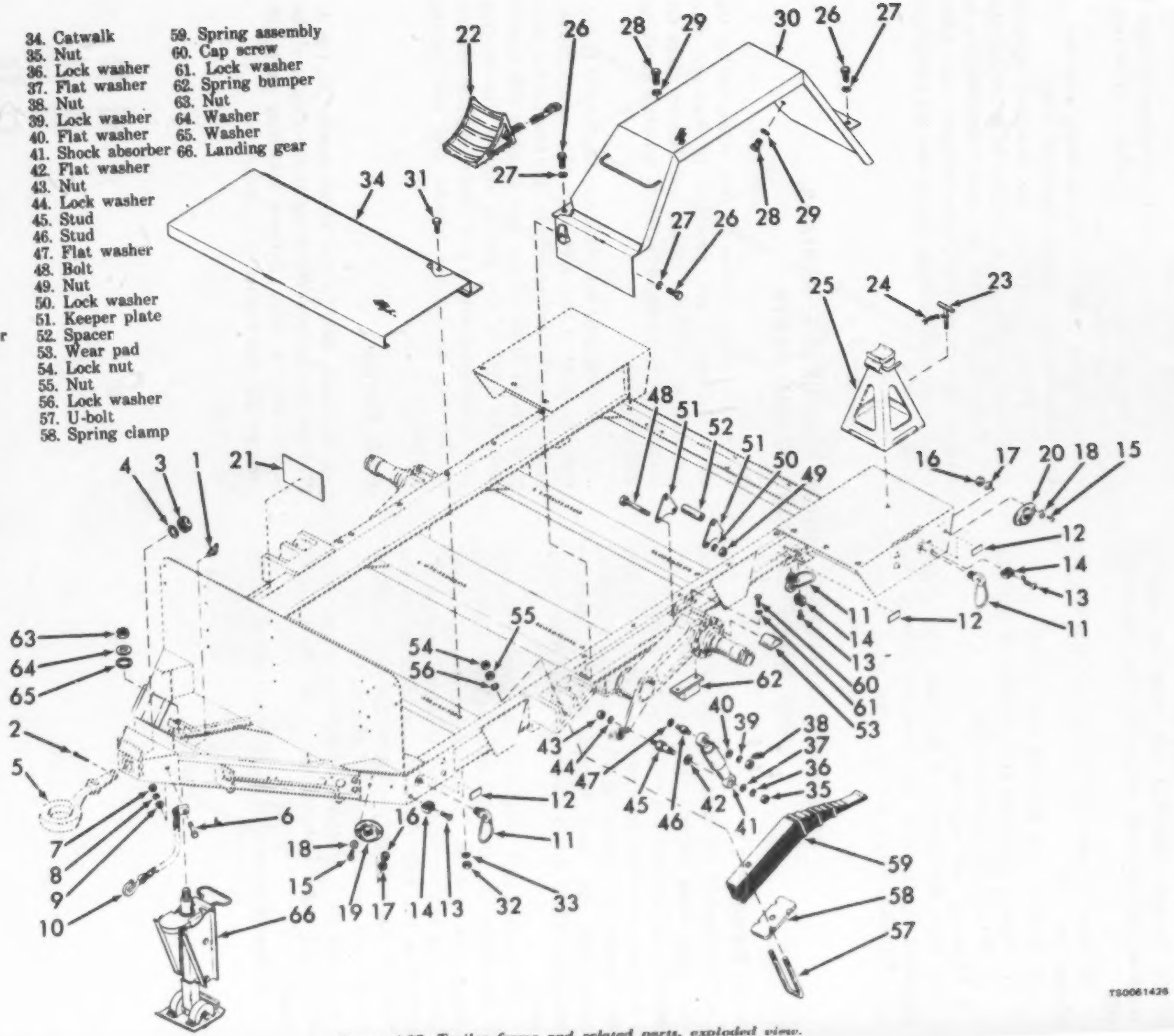


Figure 4-27. Trailer frame and related parts, exploded view.

b. Cleaning and Inspection.

(1) Clean the fenders with a pressure water hose or with steam-cleaning equipment. If necessary, remove greasy or gummy deposits with dry cleaning solvent (fed. spec. P-D-680).

(2) Inspect the fenders for cracks, distortion, broken weldments, loose wheel chock mounting bracket, and other damage. Straighten a bent fender and reweld cracked weldments. Replace a badly damaged fender.

c. Installation. Install the fender as shown in figure 4-27, items 26 through 30. Install wheel chocks (22) in the brackets on the fenders.

4-69. Shock Absorbers

a. Checkout. Checkout of the shock absorbers is most easily accomplished while they are mounted on the vehicle. Proceed as follows:

(1) Alternately apply and release force on the frame to cause the unit to rock on its springs. The rocking must stop immediately when force is no longer applied. Continued rocking indicates faulty shock absorbers.

(2) Check the shock absorbers for leaks, worn mounting holes, loss of resilience of rubber bushings, dents, and other damage.

(3) If defective, replace shock absorbers per subparagraph *b* below.

b. Replacement.

(1) Remove nuts (35 and 38, fig. 4-27), lock washers (36 and 39), and flat washers (37 and 40); remove the shock absorbers (41) from the studs (45 and 46) on the frame and axle. Remove the flat washers (42) from the axle-mounted studs.

(2) Check the studs for distortion, damaged threads, wear, and other damage. Replace if defective.

(3) Install new shock absorbers by reversing the removal procedure. After installation, check the operation of the shock absorbers per subparagraph *a* above.

4-70. Springs.

a. Removal.

(1) Jack up and block under the trailer frame to relieve the weight of the axle against the spring.

(2) Remove the three bolts (48, fig. 4-27), nuts (49), and lock washers (50) that secure the keeper plates (51) and spacer (52) to the axle. Remove the keeper plates and spacer. Remove the wear pad (53) from the axle.

(3) Support the weight of the spring (59) with a hoist. Remove the four lock nuts (54), nuts (55), and lock washers (56) from the two U-bolts (57). Remove the U-bolts and spring clamp (58) and remove the spring assembly (59).

(4) Remove the cap screws (60) and lock washers (61) and remove the spring bumper (62) from the frame.

b. Cleaning and Inspection.

(1) Steam-clean the spring.

CAUTION

Do not flush the spring with solvents. This could remove lubricants from between spring leaves, decreasing the effectiveness of the springs.

(2) Inspect the spring for broken leaves, cracks or missing retainers, and loss of normal curvature. Replace if defective.

(3) Replace the wear pad. Inspect all other parts for cracks, distortion, damaged threads, and other damage; replace damaged parts.

c. Installation. Installation is the reverse of the removal procedure. Refer to items 48 through 62 of figure 4-27. After installation, carefully lower the jacks so that the weight of the unit rests on the springs. Check that the unit rides easily and rocks properly when force is alternately applied and released on the frame.

4-71. Landing Gear

a. Removal.

(1) Use the landing gear crank to raise the landing gear (66, fig. 4-27) to its fully extended position and apply blocking under the front of the towbar. Crank the landing gear to the fully retracted position.

(2) Remove the nut (63) and two washers (64 and 65) that secure the landing gear to the tube welded on the towbar, while supporting the weight of the landing gear. Remove the landing gear.

(3) Refer a defective landing gear to direct support maintenance for repair.

b. Installation. Installation is the reverse of removal. Refer to items 63 through 66 of figure 4-27. After installation, check that the landing gear operates properly.

4-72. Miscellaneous Frame Parts

a. Removal. Refer to figure 4-27 and remove parts as necessary.

(1) Remove the lunette (5) from the towbar of the trailer by removing slotted nut (3) and flat washer (4). Remove the towing safety chains (10) by removing cap screws (6), nuts (7), lock washers (8), and flat washers (9).

(2) Unscrew the lifting eyes (11) from the trailer frame and remove retaining clips (14) by removing screws (13).

(3) Remove the reflectors (19 and 20) from the trailer frame by removing screws (15), nuts (16), lock washers (17), and flat washers (18).

(4) The safety stands (25) are secured to the trailer frame by T-bolts (23).

b. Cleaning and Inspection.

(1) Wipe the reflectors with a clean, dry cloth. Use commercial glass cleaner or detergent and water if necessary.

(2) Clean all remaining parts with dry cleaning solvent (fed. spec. P-D-680).

(3) Inspect the lunette for cracks, distortion, damaged threads, and clogged lubrication passage. Use a small drill bit to open the lubrication passage if it is clogged.

(4) Inspect the lifting eyes for cracks, distor
and damaged threads. Replace if damaged. No r
is authorized on the lifting eyes.

(5) Inspect the reflectors for cracked lenses
distorted lens mounts. Replace reflectors if defec

(6) Inspect the safety stands for cracks, di
tion, and damage; replace a damaged safety st

c. Installation. Installation is the revers
removal. Refer to figure 4-27.

CHAPTER 5
DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, AND EQUIPMENT

5-1. Special Tools and Equipment

You do not require any special tools or equipment for the repair and maintenance of the lubricating and servicing unit.

5-2. Maintenance Repair Parts

Repair parts and equipment are listed and illustrated in the repair parts and special tools list covering direct support and general support maintenance for this lubricating and servicing unit. Refer to TM 5-4930-218-24P when you need replacement parts information.

Section II. TROUBLESHOOTING

5-3. General

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop in the lubricating and servicing unit. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. Perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections, or corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. Only those functions which are solely within the scope of direct and general support maintenance are listed. For troubleshooting procedures which are within the scope of operator/crew and organizational maintenance, you should refer to Chapters 3 and 4 of this manual.

5-4. Direct Support and General Support Maintenance Troubleshooting

Refer to table 5-1 for troubleshooting which is allocated to direct support and general support maintenance levels.

Table 5-1. Direct Support and General Support Troubleshooting

MALFUNCTION
    TEST OR INSPECTION
        CORRECTIVE ACTION

TRANSFER PUMP

1. TRANSFER PUMP OPERATES BUT FAILS TO PUMP LUBRICANTS.
    - Step 1. Check for sticking foot valve.
        - Disassemble pump as necessary to free sticking foot valve (para 6-2).
    - Step 2. Check for faulty low pressure valve.
        - Disassemble pump as necessary to inspect valve and its seat on the piston nut. Replace valve or piston nut (para 6-2).
    - Step 3. Check for faulty low pressure leather cup.
        - Disassemble pump as necessary to inspect leather cup. Replace if deteriorated or not pliable (para 6-2).
2. TRANSFER PUMP DOES NOT OPERATE.
    - Step 1. Check for faulty packings on intake and exhaust valve stems.
        - Disassemble pump as necessary to replace packings on valve stems (para 6-2).
3. TRANSFER PUMP AIR PISTON TUBE NOT MOVING OR BLOWS AIR THROUGH PISTON ROD ADAPTER.
    - Step 1. Check for faulty packings on exhaust valve stem and packing between tube and body.
        - Disassemble pump as necessary to replace defective packings (para 6-2).
    - Step 2. Check for faulty packings on air piston and in body.
        - Disassemble pump as necessary to replace packings (para 6-2).
    - Step 3. Check for binding operating mechanism due to insufficient lubrication.
        - Disassemble pump as necessary to free mechanism; add lubricant to oiler.

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Table 5-1. Direct Support and General Support Troubleshooting—Continued

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

HIGH PRESSURE LUBRICANT PUMP

1. HIGH PRESSURE PUMP OPERATES BUT FAILS TO PUMP LUBRICANTS.

Step 1. Check for faulty check ball or ball seat.

Disassemble pump as necessary to check ball and seat. Replace defective parts (para 6-7).

Step 2. Check for defective primer piston.

Disassemble pump as necessary to replace primer piston (para 6-7).

2. HIGH PRESSURE PUMP DOES NOT OPERATE.

Step 1. Check for faulty packings on intake and exhaust valve stems.

Disassemble pump as necessary to replace packings on valve stems (para 6-7).

Step 2. Check for bent or damaged shafts and cylinders.

Disassemble pump as necessary to replace defective parts (para 6-7).

3. HIGH PRESSURE PUMP LEAKS GREASE FROM EXHAUST HOLE IN AIR CYLINDER HOUSING.

Step 1. Check for faulty V-packing around upper pump rod.

Disassemble pump as necessary and replace packings (para 6-7).

4. HIGH PRESSURE PUMP FAILS TO DELIVER RATED PRESSURE OR VOLUME.

Step 1. Check for defective packings and valve seats.

Disassemble pump as necessary to replace defective parts (para 6-7).

Step 2. Check for bent or scored shafts on cylinders.

Disassemble pump as necessary to replace defective parts (para 6-7).

LOW PRESSURE LUBRICATING PUMPS

1. LOW PRESSURE PUMP OPERATES BUT FAILS TO PUMP LUBRICANTS.

Step 1. Check for faulty foot valve.

Disassemble pump as necessary to replace foot valve. Replace parts as necessary (para 6-8).

Step 2. Check for faulty transfer valve.

Disassemble pump as necessary to replace faulty transfer valve (para 6-8).

2. LOW PRESSURE PUMP DOES NOT OPERATE.

Step 1. Check for faulty packings on intake and exhaust valve stems.

Disassemble pump as necessary to replace packings on valve stems (para 6-8).

Step 2. Check for bent shafts and cylinders.

Disassemble pump and replace defective shafts and cylinders (para 6-8).

3. LOW PRESSURE PUMP LEAKS OIL FROM EXHAUST HOLE IN AIR CYLINDER HOUSING.

Step 1. Check for faulty V-packing around upper pump rod.

Disassemble pump as necessary to replace packing (para 6-8).

4. LOW PRESSURE PUMP FAILS TO DELIVER RATED PRESSURE OR VOLUME.

Step 1. Check for defective packings and valve seats.

Disassemble pump as necessary to replace defective parts (para 6-8).

Step 2. Check for bent or scored shafts and cylinders.

Disassemble pump as necessary to replace defective parts (para 6-8).

ENGINE OIL AND GEAR OIL DISPENSERS

1. DISPENSER DELIVERS OIL FROM NOZZLE WITHOUT OPERATING TRIGGER.

Step 1. Check for faulty valve and seat, or broken spring.

Disassemble as necessary to replace valve and seat, or spring (para 6-10).

Step 2. Check for binding of trigger cam.

Disassemble as necessary to free or replace trigger cam (para 6-10).

2. DISPENSER LEAKS OIL AROUND DIAL.

Step 1. Check for faulty packing around spindle gear and shaft.

Disassemble as necessary to replace packing (para 6-10).

Step 2. Check for scored spindle.

Disassemble as necessary to replace spindle and gear (para 6-10).

3. DISPENSER LEAKS OIL AROUND TRIGGER CAM.

Step 1. Check for faulty quad rings on trigger cam.

Disassemble as necessary to replace quad rings (para 6-10).

4. DISPENSER LEAKS OIL BETWEEN CAP AND HOUSING.

Step 1. Check for faulty preformed packing between cap and housing.

Disassemble as necessary to replace preformed packing (para 6-10).

GREASE DISPENSER

1. DISPENSER DELIVERS GREASE WITHOUT OPERATING TRIGGER.

Step 1. Check for stuck or bent plunger.

Disassemble as necessary to clean or replace plunger (para 6-12).

Step 2. Check for faulty ball and ball seat, or broken spring.

Disassemble as necessary to replace ball, seat, or spring (para 6-12).

Table 5-1. Direct Support and General Support Troubleshooting—Continued

MALFUNCTION
  TEST OR INSPECTION
    CORRECTIVE ACTION

GREASE DISPENSER—continued

2. DISPENSER FAILS TO DELIVER GREASE WHEN TRIGGER IS OPERATED.
  Step 1. Check trigger adjustment.
    Adjust trigger (para 6-12).
  Step 2. Check flow adjusting screw.
    Turn trigger knurled screw counterclockwise to increase flow (para 6-12).

AIR COMPRESSOR

1. COMPRESSOR FAILS TO PUMP RATED PRESSURE OR VOLUME.
  Step 1. Check for faulty intake of exhaust valves.
    Repair or replace faulty valves (para 7-5).
  Step 2. Check for worn piston rings, which prevent sufficient compression.
    Replace defective rings (para 7-8).
  Step 3. Check for faulty unloader mechanism holding open intake valve.
    Free or adjust unloader mechanism (para 7-3).
2. COMPRESSOR OVERHEATS.
  Step 1. Check for defective crankshaft bearings.
    Replace defective bearings (para 7-9).
  Step 2. Check for defective rod bearings.
    Replace defective rod bearings (para 7-8).
  Step 3. Check for exhaust valve stuck closed.
    Free, repair, or replace exhaust valve (para 7-5).
3. COMPRESSOR VIBRATES EXCESSIVELY.
  Step 1. Check for flywheel misalinement.
    Remove, clean, and reinstall flywheel. Replace if vibration continues (para 7-2).
  Step 2. Check for stuck valve.
    Clean, repair, or replace valve (para 7-5).
  Step 3. Check for defective crankshaft bearings.
    Replace defective bearings (para 7-9).
  Step 4. Check for defective rod bearings.
    Replace defective rod bearings (para 7-8).
  Step 5. Carbon buildup on piston or in cylinder interferes with piston travel.
    Disassemble piston and clean out carbon deposit (para 7-8).

BRAKE RELAY VALVE

1. RELAY VALVE FAILS TO BRAKE VEHICLE WHEN ACTUATED BY TOWING VEHICLE.
  Step 1. Check for ruptured diaphragm.
    Disassemble valve and replace diaphragm (para 8-2).
  Step 2. Check for sticking plunger or valve.
    Disassemble relay valve. Clean and free parts (para 8-2).
2. TRAILER AIR RESERVOIRS LOSE AIR THROUGH BRAKE RELAY VALVE.
  Step 1. Check for faulty check valve spring.
    Disassemble as necessary to replace check valve spring (para 8-2).
  Step 2. Check for faulty inlet valve spring which should keep inlet valve closed.
    Disassemble as necessary to replace inlet valve spring or inlet valve (para 8-2).
  Step 3. Check for faulty preformed packings around piston.
    Disassemble as necessary to replace preformed packings (para 8-2).
  Step 4. Check for faulty preformed packing around check valve plug.
    Remove plug and replace packing (para 8-2).

AXLE ASSEMBLY

1. TRAILER TIRES WEAR UNEVENLY.
  Step 1. Inspect axle tube for bent condition.
    Straighten axle tube or replace axle assembly (para 9-6 through 9-8).
  Step 2. Inspect for misalined frame.
    Straighten frame (para 9-10 through 9-12).
2. EXCESS PLAY OF AXLE TUBE IN BEARINGS.
  Step 1. Check for excessively worn split bearings.
    Remove axle and replace split bearings (para 9-10 through 9-12).

LANDING GEAR

1. LANDING GEAR WILL NOT EXTEND OR RETRACT.
  Step 1. Shaft screw, inner tube, or outer tube is bent and binding.
    Disassemble landing gear as necessary to replace defective parts (para 9-2 through 9-4).

Table 5-1. Direct Support and General Support Troubleshooting—Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

LANDING GEAR—continued

2. LANDING GEAR HARD TO EXTEND OR RETRACT.

Step 1. Check for lack of lubricant in gear head and on shaft screw.

Disassemble landing gear as necessary to replace gear head with grease. Also apply grease to shaft screw (para 9-2 throu
9-4).

Section III. GENERAL MAINTENANCE

5-5. General

a. This section contains general maintenance instructions which you must observe during removal, disassembly, repair, and reassembly of component assemblies that were removed from the trailer because of malfunction.

b. Prior to removing component assemblies, you should thoroughly clean the surrounding area and the exterior surfaces of the unit being removed. Use dry cleaning solvent (fed. spec. P-D-680) for most general cleaning requirements. If assemblies are caked with grease, use a steam cleaner with solvent. Take care to wear protective clothing when degreasing. Clean new components or parts if they are received with a preservative coating.

c. When disassembling components, tag and identify any matched or mated parts in the unit so that they can be returned to their original locations or positions when reassembled.

d. Prior to component assembly, make certain that your hands, work bench, assembly tools, and parts to be assembled are thoroughly clean. Use clean, lint-free shop cloths or paper towels when necessary to wipe parts.

e. When reassembling components, be sure that
you coat moving and sliding parts with a light
Also coat packings and oil seal lips with light
This reduces the possibility of cutting the packin
and seal lips when installing over sharp edges
threads.

f. If assembly work cannot be completed the sa
day, cover the assembly and remaining parts wi
clean cloths or sheet plastic to keep out dust and c
taminants which accumulate overnight. Apply
light coat of oil to the remaining parts, and cle
parts prior to beginning reassembly the followi
day.

g. After reassembly is completed, reclean the
terior surfaces and check condition of paint. If pai
was damaged during reassembly, sand the areas
fected and touch up with the correct paint and col
If sanded areas are through the paint and down
bare metal, apply a primer coat and sand ligh
before applying final coat. Mask off areas or pa
that are not to be painted.

h. Make certain components are initially greas
or filled with oil, so that there is no chance
damage prior to scheduled service of the compone
If lubrication is not practical, you should tie a w
ning tag on the equipment indicating unit has be
drained and must be serviced before operation.

CHAPTER 6
REPAIR OF LUBRICANT DISPENSERS

Section I. TRANSFER PUMP

6-1. Description

The transfer pump is a portable air-operated device used for transferring lubricants from original drum to the lubricant tanks.

6-2. Disassembly

a. Remove transfer pump as instructed in paragraph 2-6.

b. Remove the nozzle (1, fig. 6-1), coupling (2), hose (4) if attached to the transfer pump. Place caps on the hose to prevent entry of dirt.

1. Nozzle
2. Coupling
3. Cap and cord
4. Hose
5. Cap and chain
6. Air nipple and screen
7. Valve
8. Nipple
9. Filler cap
10. Preformed packing
11. Head
12. Gasket
13. Oil wick
14. Wick tube
15. Sight tube
16. Gasket
17. Oiler body
18. Nipple
19. Foot valve body
20. Retainer
21. Ball
22. Tube
23. Nut
24. Low pressure valve
25. Piston nut
26. Leather cup
27. Lower piston
28. Spring
29. Washer
30. Cylinder
31. Cotter pin
32. Lower pump rod
33. Upper pump rod
34. Packing
35. Upper piston
36. Support
37. Cap
38. Spring
39. Air cylinder
40. Nut
41. Preformed packing
42. Nut
43. Upper valve plate
44. Exhaust valve stem
45. Nut
46. Intake valve stem
47. Preformed packing
48. Preformed packing
49. Air piston
50. Lower valve plate
51. Adapter
52. Adapter
53. Tube
54. Spring
55. Preformed packing
56. Drive screw
57. Name plate
58. Inlet body

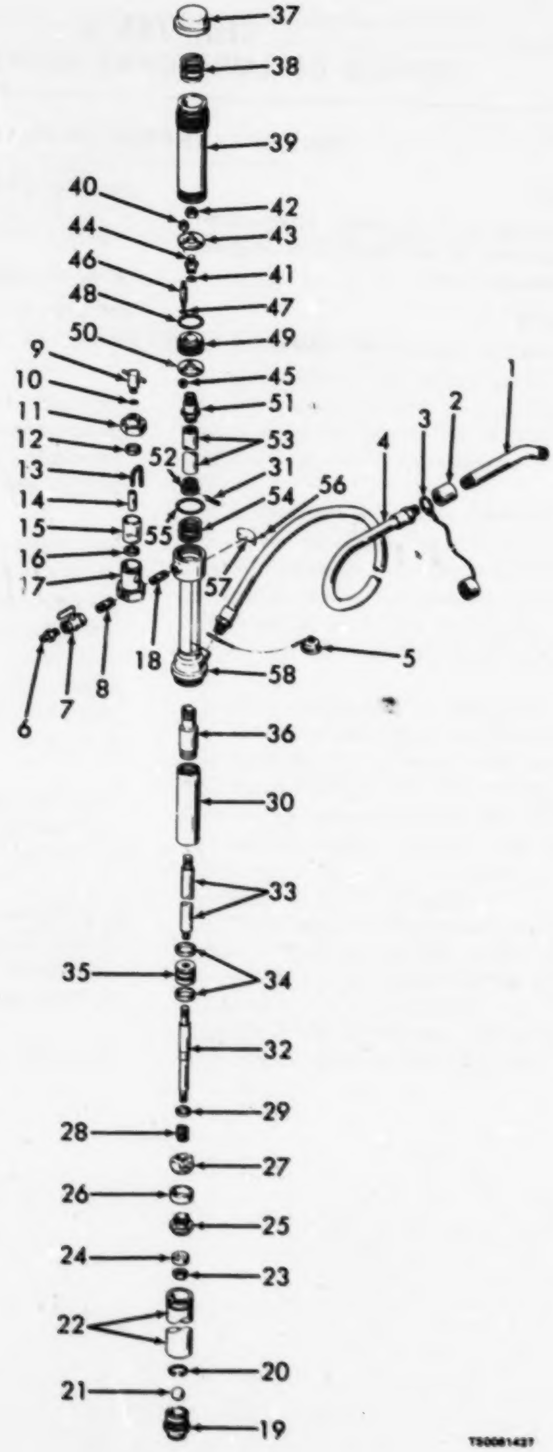


Figure 6-1. Transfer pump, exploded view.

c. Remove air nipple and screen (6), valve (7), and nipple (8).

d. You can unscrew and remove the oiler assembly (9 through 17) and disassemble on bench. Remove the filler cap (9) and packing (10). Unscrew the oiler head (11) and remove the gasket (12), oil wick (13), wick tube (14), sight tube (15), and gasket (16) from the oiler body (17).

e. Unscrew the foot valve body (19) from the pump tube (22) and remove retainer (20) and ball (21).

NOTE

To prevent marring surface finishes, use a suitable strap wrench to hold parts without wrenching flats or parts that have polished surfaces. Use a soft-jawed vise when clamping parts to disassemble.

f. Unscrew and remove the pump tube (22) from the pump inlet body (58).

g. After nut (23) and low pressure valve (24) are removed, piston assembly (25, 26, and 27), spring (28), and washer (29) will slide off lower pump rod (32).

h. Unscrew and remove the cylinder (30) from the cylinder support (36).

i. After cotter pin (31) is removed, unscrew assembled upper pump rod (33), lower pump rod (32), and upper piston (35) from adapter (52). Unscrew pump rods from the piston. Unscrew the cylinder support (36).

j. Remove cylinder cap (37), spring (38), and then unscrew and remove air cylinder (39).

k. Push air piston tube assembly (40 through 53) out of pump body and disassemble. Use care when handling polished surfaces of air piston tube. To remove upper valve plate (43) and exhaust valve stem (44), remove nuts (40 and 42) and packing (41). Remove nuts (45) to remove lower valve plate (50), intake valve stem (46), and packing (47) from air piston (49). Unscrew air piston from adapter (51). Unscrew and remove air piston adapter (51) and piston rod adapter (52) from air piston tube.

l. Remove spring (54) and packing (55) from inlet body (58).

6-3. Cleaning and Inspection

a. Discard and replace all packings.

b. Clean all remaining parts with dry cleaning solvent (fed. spec. P-D-680).

c. Check to see that foot valve is clean and free from dirt and foreign matter. Inspect ball and seat in valve body for damage. Also check low pressure valve for damage to seat face.

d. Check to see that air valve is clean and operates easily.

e. Inspect pump rods and tubes for cracks, breaks, or other defects which would prevent proper operation.

6-4. Repair

a. Repairs consist mainly of replacing all packings and parts which fail to pass inspection.

b. You can remove minor nicks or scratches using a fine stone, then polish with fine emery cloth or crocus cloth. Reclean parts after polishing.

c. Clean up any damaged threads using a fine file or taps and dies of the correct size.

6-5. Reassembly

a. Reassembly is essentially the reverse of disassembly. Note the following:

(1) You should apply a light coating of engine oil on all packings, leather cup, and tubes with interior or exterior sliding surfaces.

(2) Assemble air piston tube assembly (40 through 53, fig. 6-1) on a bench. When completed, check action of upper and lower valve plates and valves. Valve plates should move freely with no binding of the lower valve plate on the air piston adapter (51). If valve operation is satisfactory, lubricate the inside of tube and carefully install in pump body.

(3) Assemble upper and lower pump rods (33 and 32) to piston (35). Install packings (34) on piston and lubricate liberally with engine oil. Install assembly, upper pump rod first, through cylinder (30) and thread into adapter (52). Aline holes in upper pump rod and adapter, then install cotter pin (31).

NOTE

To prevent damage to piston packing, use care when inserting the piston into the cylinder. The chamfer on the inside edge of the cylinder should compress the packing and the piston should enter the cylinder easily.

(4) Place flat side of leather cup (26) against flat surface of piston nut (25), then thread lower piston (27) on piston nut. Tighten parts sufficiently, but do not distort leather cup. Leather cup will flare out if excessively tightened and rapid wear of the cup will result.

(5) Assemble oiler and component parts (6 through 18) on the bench, and install as an assembly in the pump body. Fill oiler assembly with recommended lubricant.

b. After reassembly you should test the transfer pump for correct operation. Proceed as follows:

(1) Install transfer pump in a drum of lubricant. Connect transfer hose to pump.

(2) Make certain that shutoff valve, adjacent to oiler, is closed.

(3) Connect an outside air supply of approximately 150 psi to the transfer pump.

(4) Direct hose nozzle into a container, then slowly open shutoff valve. Open valve sufficiently to check pump operation.

(5) If pump functions correctly, shut off air at the pump and disconnect air supply.

Section II. LUBRICANT PUMPS

6-6. Description

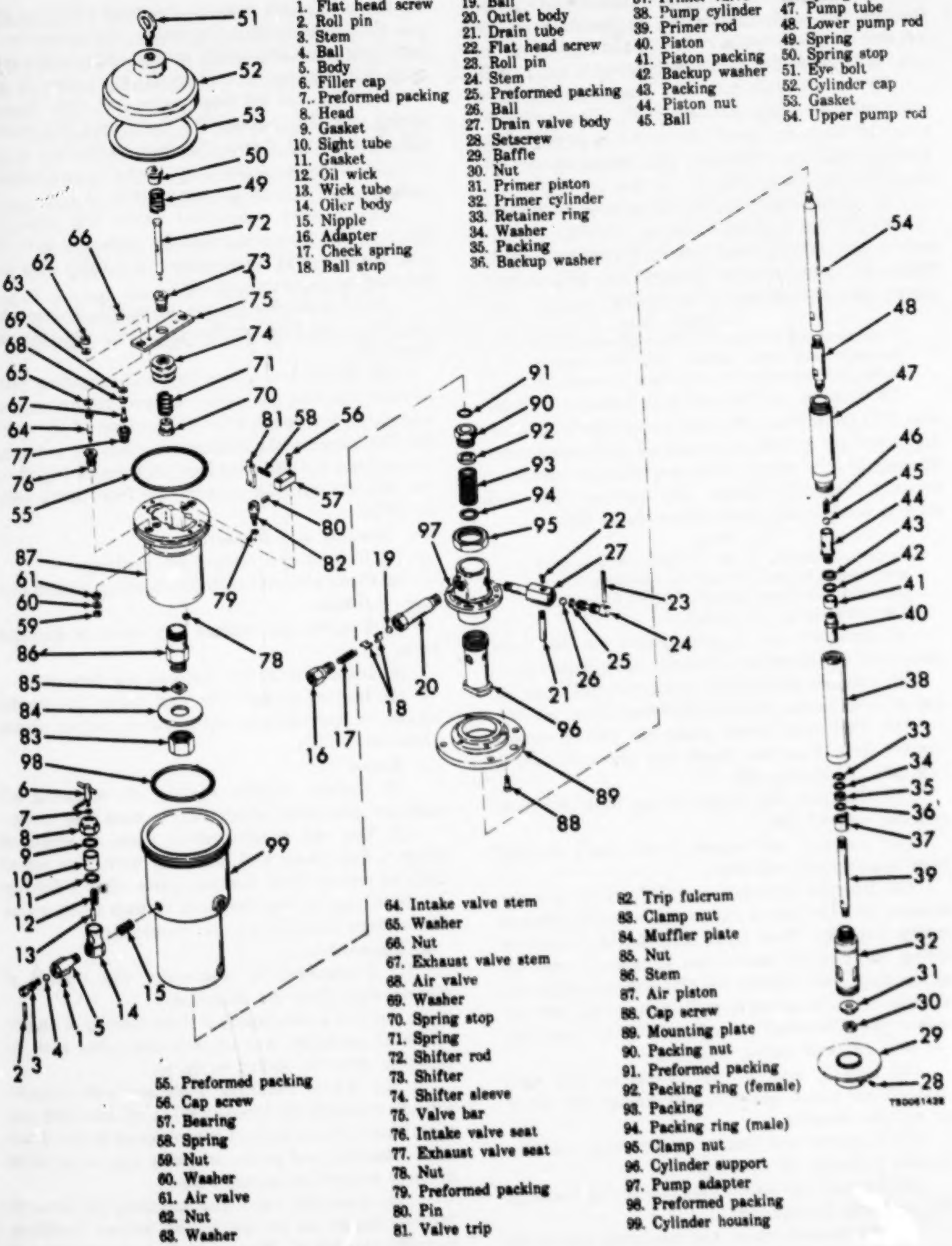
The air-powered pumps are mounted opposite the hose reels. A high pressure, 50-to-1 ratio pump is mounted on the center lubricant container. It pumps grease. One 10-to-1 ratio low pressure pump is mounted on each of the two outside lubricant containers to pump engine oil and gear oil. The pumps are heavy-duty piston type designed for volume operation under extreme conditions.

6-7. High Pressure Lubricant Pump

a. Disassembly.

(1) Remove high pressure pump as instructed in paragraph 4-49.

(2) Unscrew and remove the oiler assembly (1 through 15, fig. 6-2) so that you can disassemble it on a bench. Remove screw (1), stem (3), and ball (4). It is not necessary to remove roll pin (2) from stem. Remove filler cap (6) and packing (7). Unscrew oiler head (8) and remove gasket (9), sight tube (10), gasket (11), oil wick (12), and wick tube (13) from oiler body (14).



1. Flat head screw
2. Roll pin
3. Stem
4. Ball
5. Body
6. Filler cap
7. Preformed packing
8. Head
9. Gasket
10. Sight tube
11. Gasket
12. Oil wick
13. Wick tube
14. Oiler body
15. Nipple
16. Adapter
17. Check spring
18. Ball stop
19. Ball
20. Outlet body
21. Drain tube
22. Flat head screw
23. Roll pin
24. Stem
25. Preformed packing
26. Ball
27. Drain valve body
28. Setscrew
29. Baffle
30. Nut
31. Primer piston
32. Primer cylinder
33. Retainer ring
34. Washer
35. Packing
36. Backup washer
37. Primer valve
38. Pump cylinder
39. Primer rod
40. Piston
41. Piston packing
42. Backup washer
43. Packing
44. Piston nut
45. Ball
46. Spring
47. Pump tube
48. Lower pump rod
49. Spring
50. Spring stop
51. Eye bolt
52. Cylinder cap
53. Gasket
54. Upper pump rod
55. Preformed packing
56. Cap screw
57. Bearing
58. Spring
59. Nut
60. Washer
61. Air valve
62. Nut
63. Washer
64. Intake valve stem
65. Washer
66. Nut
67. Exhaust valve stem
68. Air valve
69. Washer
70. Spring stop
71. Spring
72. Shifter rod
73. Shifter
74. Shifter sleeve
75. Valve bar
76. Intake valve seat
77. Exhaust valve seat
78. Nut
79. Preformed packing
80. Pin
81. Valve trip
82. Trip fulcrum
83. Clamp nut
84. Muffler plate
85. Nut
86. Stem
87. Air piston
88. Cap screw
89. Mounting plate
90. Packing nut
91. Preformed packing
92. Packing ring (female)
93. Packing
94. Packing ring (male)
95. Clamp nut
96. Cylinder support
97. Pump adapter
98. Preformed packing
99. Cylinder housing

Figure 6-2. High pressure lubricant pump, exploded view.

(3) Unscrew and remove outlet assembly (16 through 20), and disassemble on bench. Unscrew adapter (16) from outlet body (20) and remove spring (17), ball stops (18), and ball (19).

(4) Remove drain tube (21). Unscrew and remove drain valve assembly (22 through 27). Disassemble on bench by removing screw (22), stem (24), packing (25), and ball (26) from valve body (27). Do not remove roll pin (23) from stem (24).

(5) Loosen setscrew (28) and remove baffle (29).

(6) Place a holding rod or pin through slots in primer cylinder (32) and hole in primer rod (39) to keep rod from turning. Remove nut (30), primer piston (31), and primer cylinder (32).

NOTE

It may be necessary to unscrew primer cylinder (32) and disengage from pump cylinder (38). Pull down on primer cylinder and rod to expose hole in primer rod.

(7) Unscrew and remove high pressure cylinder assembly (33 through 38) from pump tube (47). After high pressure cylinder is separated from pump tube, disassemble the primer valve assembly by removing retainer ring (33), washer (34), packing (35), and backup washer (36) from primer valve (37).

NOTE

To prevent marring surface finishes, use a suitable strap wrench to hold parts without wrenching flats or parts that have polished surfaces. Use a soft-jawed vise when clamping parts to disassemble.

(8) Unscrew and remove primer rod (39) from piston (40) by inserting a holding rod in piston hole.

(9) Unscrew and remove piston (40), packings (41 and 43), and backup washer (42) from piston nut (44).

(10) Pull down lower pump rod (48) to expose wrench flats. Unscrew piston nut (44) and remove ball (45) and spring (46).

(11) Unscrew and remove pump tube (47) from cylinder support (96).

(12) Unscrew and remove lower pump rod (48) from upper pump rod (54).

(13) Unscrew cylinder cap (52) from air cylinder housing (99). Pull out to expose valve spring (49) and spring stop (50). Place large screwdriver in coils of spring (49) and pry downward so spring snaps off spring stop. Valve shifter rod (72) will then slide out of keyhole slot in spring stop. Remove spring (49) and gasket (53). Disassemble cylinder cap by removing eye bolt (51) and spring stop (50).

(14) Pushing against upper pump rod (54), push complete air piston assembly (56 through 87) out of air cylinder housing.

(15) Unscrew and remove upper pump rod (54). Remove packings (55 and 98).

(16) Remove cap screws (56), trip spring bearings (57), and trip springs (58).

(17) To remove valve bar assembly (items 62 through 75), first remove nuts (59), washers (60), and air valves (61). Lift valve bar assembly off piston (87

(18) Disassemble the valve bar assembly b removing nuts (62 and 66), washers (63), intake val stem (64), exhaust valve stem (67), air valve (68), a washers (65 and 69) from valve bar (75). Remo spring stop (70), spring (71), shifter rod (72), shift (73), and shifter sleeve (74) from valve bar.

(19) Remove intake valve seat (76) and exhau valve seat (77) from air piston (87).

(20) Remove assembled valve trip (81) a fulcrum (82) from air piston by removing nuts (7 and packing (79). Disassemble the valve trip a fulcrum by removing pin (80).

(21) Disassemble the air piston (87) by removi the clamp nut (83), muffler plate (84), nut (85), a stem (86).

(22) When cap screws (88) and mounting pla (89) are removed, the high pressure cylinder suppo assembly (90 through 97) will come out of the cyli der. Disassemble the support assembly by removi the packing nut (90), packings (91 through 94), clam nut (95), and cylinder support (96) from pump ada ter (97).

b. Cleaning and Inspection.

(1) Discard and replace all packings.

(2) Clean all parts with dry cleaning solvent (fe spec. P-D-680).

(3) Inspect and replace any worn or damage parts.

(4) Inspect threaded surfaces for damage.

(5) Inspect pump rods and tubes for crack breaks, or other defects which would prevent prop operation.

c. Repair

(1) Repairs consist mainly of replacing packings and parts which fail to pass inspection

(2) You can remove minor nicks or scratch using a fine stone and polishing with fine eme cloth or crocus cloth. Reclean parts after polishin

(3) Clean up any damaged threads using a fi file or taps and dies of the correct size.

d. Reassembly.

(1) Reassembly is essentially the reverse disassembly. Note the following:

(*a*) You should apply a light coating of engi oil on all packings, and on rods and tubes with i terior or exterior sliding surfaces.

(*b*) When installing high pressure cylind support assembly (90 through 97) in cylinder (99), y must make certain support is positioned so that dra valve assembly and outlet assembly can be install in their respective tapped holes.

(*c*) Assemble valve bar assembly (64 throu 75) and install on air piston (87) before installi items 56 through 61. When installed, check action valve bar. Bar should move up and down freely wi no binding on the valve shifter (73).

(*d*) Before installing cylinder cap (52), be sure spring (49) is snapped in place on valve spring stop (50) and that valve shifter rod (72) is engaged in keyhole slot of spring stop.

(*e*) Assemble drain valve assembly (22 through 27) on the bench, then install through hole provided in air cylinder. Make certain tapped hole in body is alined with hole in mounting flange; install drain tube (21).

(*f*) Assemble outlet assembly (16 through 20) and oiler assembly (1 through 15) on the bench, then install through holes provided in air cylinder. Fill oiler with recommended lubricant.

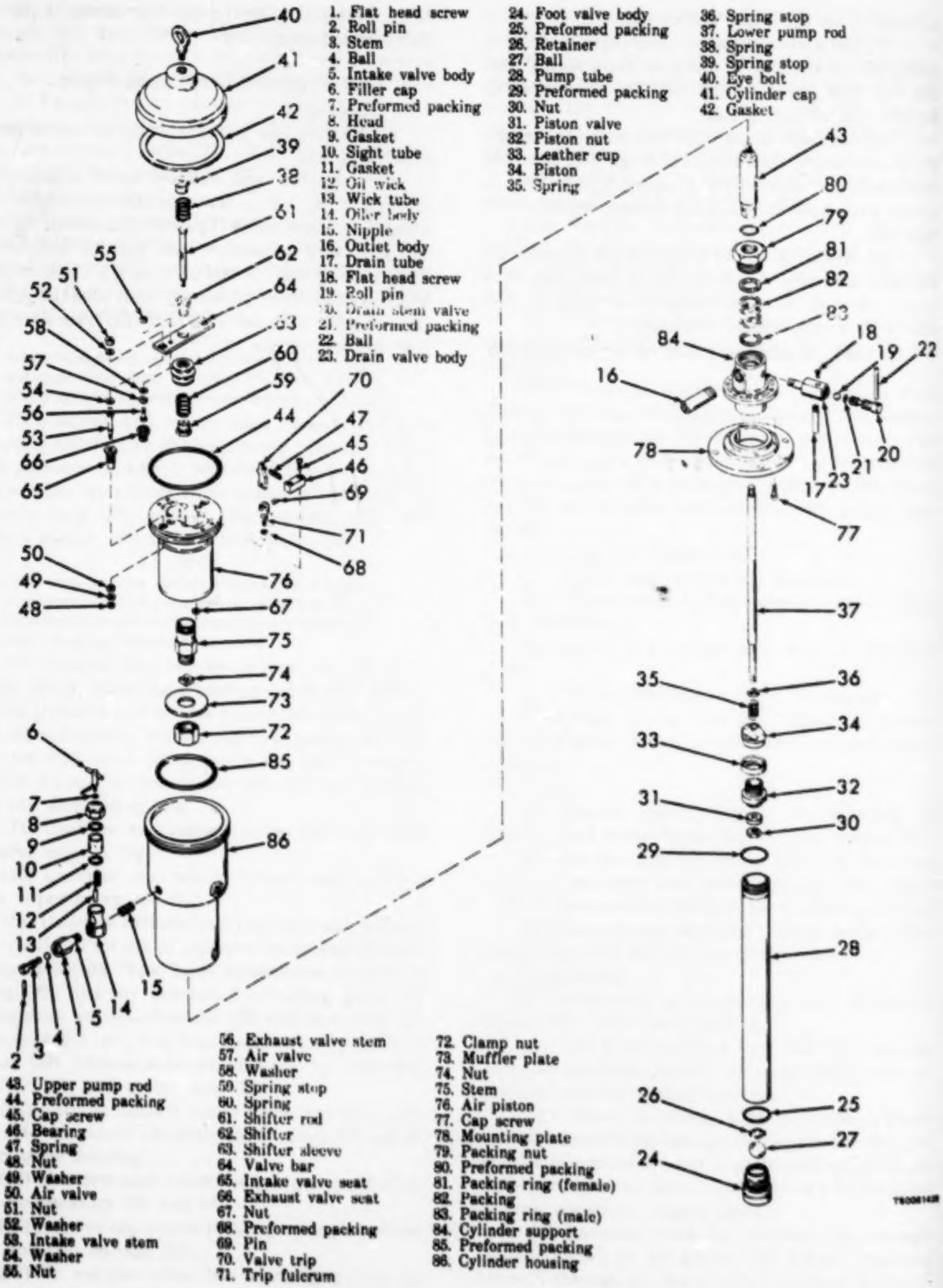
(2) Refer to paragraph 4-49 for installing pump. After installation, test pump for correct operation. Refer to paragraph 2-8.

6-8. Low Pressure Lubricant Pump.

a. Disassembly.

(1) Remove low pressure pump as instructed in paragraph 4-49.

(2) Unscrew and remove oiler assembly (1 through 15, fig. 6-3) so that you can disassemble it on a bench. Remove screw (1), stem (3), and ball (4). It is not necessary to remove roll pin (2) from stem. Remove filler cap (6) and packing (7). Unscrew oiler head (8) and remove gasket (9), sight tube (10), gasket (11), oil wick (12), and wick tube (13) from oiler body (14). Remove nipple (15).



1. Flat head screw
2. Roll pin
3. Stem
4. Ball
5. Intake valve body
6. Filler cap
7. Preformed packing
8. Head
9. Gasket
10. Sight tube
11. Gasket
12. Oil wick
13. Wick tube
14. Oiler body
15. Nipple
16. Outlet body
17. Drain tube
18. Flat head screw
19. Roll pin
20. Drain stem valve
21. Preformed packing
22. Ball
23. Drain valve body
24. Foot valve body
25. Preformed packing
26. Retainer
27. Ball
28. Pump tube
29. Preformed packing
30. Nut
31. Piston valve
32. Piston nut
33. Leather cup
34. Piston
35. Spring
36. Spring stop
37. Lower pump rod
38. Spring
39. Spring stop
40. Eye bolt
41. Cylinder cap
42. Gasket
43. Upper pump rod
44. Preformed packing
45. Cap screw
46. Bearing
47. Spring
48. Nut
49. Washer
50. Air valve
51. Nut
52. Washer
53. Intake valve stem
54. Washer
55. Nut
56. Exhaust valve stem
57. Air valve
58. Washer
59. Spring stop
60. Spring
61. Shifter rod
62. Shifter
63. Shifter sleeve
64. Valve bar
65. Intake valve seat
66. Exhaust valve seat
67. Nut
68. Preformed packing
69. Pin
70. Valve trip
71. Trip fulcrum
72. Clamp nut
73. Muffler plate
74. Nut
75. Stem
76. Air piston
77. Cap screw
78. Mounting plate
79. Packing nut
80. Preformed packing
81. Packing ring (female)
82. Packing
83. Packing ring (male)
84. Cylinder support
85. Preformed packing
86. Cylinder housing

Figure 6-3. Low pressure lubricant pump, exploded view.

(3) Unscrew and remove the outlet body (16) from the cylinder support (84).

(4) Remove drain tube (17). Unscrew and remove drain valve assembly (18 through 23). Disassemble on bench by removing screw (18), stem valve (20), packing (21), and ball (22) from valve body (23). Do not remove roll pin (19) from stem valve (20).

(5) Unscrew the foot valve body (24) from the pump tube (28) and remove retainer (26), ball (27), and packing (25).

NOTE

To prevent marring surface finishes, use a strap wrench to hold parts without wrenching flats or parts that have polished surfaces. Use a soft-jawed vise when clamping parts to disassemble.

(6) Unscrew the pump tube (28) from the cylinder support (84) and remove the packing (29).

(7) After nut (30) and piston valve (31) are removed, piston assembly (32, 33, and 34), spring (35), and spring stop (36) will slide off lower pump rod (37). Separate piston nut (32), leather cup (33), and piston (34).

(8) Pull down on lower pump rod (37) to expose wrench flats on upper pump rod (43). Unscrew and remove lower pump rod.

(9) Unscrew cylinder cap (41) from air cylinder housing (86). Pull out to expose valve spring (38) and valve spring stop (39). Place large screwdriver in coils of spring (38) and pry downward so spring snaps off valve spring stop. Valve shifter rod (61) will then slide out of keyhole slot in valve spring stop. Remove spring (38) and gasket (42). Disassemble cylinder cap by removing eye bolt (40) and spring stop (39).

(10) Pushing against upper pump rod (43), push complete air piston assembly (45 through 76) out of air cylinder housing (86).

(11) Unscrew and remove upper pump rod (43). Remove packings (44 and 85).

(12) Remove cap screws (45), bearings (46), and trip springs (47).

(13) To remove valve bar assembly (items 51 through 64), first remove nuts (48), washers (49), and air valves (50). Lift valve bar assembly off piston (76).

(14) Disassemble the valve bar assembly by removing nuts (51 and 55), washers (52), intake valve stem (53), exhaust valve stem (56), air valve (57), and washers (54 and 58) from valve bar (64). Remove spring stop (59), spring (60), shifter rod (61), shifter (62), and shifter sleeve (63) from valve bar (64).

(15) Remove intake valve seat (65) and exhaust valve seat (66) from air piston.

(16) Remove assembled valve trip (70) and fulcrum (71) from air piston by removing nuts (67) and packing (68). Disassemble the valve trip and fulcrum by removing pin (69).

(17) Disassemble the air piston (76) by removing the clamp nut (72), muffler plate (73), nut (74), and stem (75).

(18) When cap screws (77) and mounting plate (78) are removed, the low pressure cylinder support assembly (79 through 84) will come out of the cylinder. Disassemble the support assembly by removing the packing nut (79) and packings (80 through 83), from the cylinder support (84).

b. Cleaning and Inspection.

(1) Discard and replace all packings.

(2) Clean all parts with dry cleaning solvent (fed. spec. P-D-680).

(3) Inspect and replace any worn or damaged parts.

(4) Inspect threaded surfaces for damage.

(5) Inspect pump rods and tube for breaks, cracks, or other defects which would prevent proper operation.

c. Repair.

(1) Repairs consist mainly of replacing all packings and parts which fail to pass inspection.

(2) You can remove minor nicks or scratches using a fine stone, then polish with fine emery cloth or crocus cloth. Reclean parts after polishing.

(3) Clean up any damaged threads using a fine file or taps and dies of the correct size.

d. Reassembly.

(1) Reassembly is essentially the reverse of disassembly. Note the following:

(*a*) You should apply a light coating of engine oil on all packings, and on rods and tubes with interior or exterior sliding surfaces.

(*b*) When installing low pressure cylinder support assembly (79 through 84) in cylinder (86), you must make certain support is positioned so that drain valve assembly and outlet can be installed in their respective tapped holes.

(*c*) Assemble valve bar assembly (51 through 64) and install on air piston (76) before installing items 45 through 50. When installed, check action of valve bar. Bar should move up and down freely with no binding on the valve shifter (62).

(*d*) Before installing cylinder cap (41), be sure spring (38) is snapped in place on valve spring stop (39) and that valve shifter rod (61) is engaged in keyhole slot of spring stop.

(*e*) Assemble drain valve assembly (18 through 23) on the bench, then install through hole provided in air cylinder. Make certain tapped hole in body is alined with hole in mounting flange, then install drain tube (17).

(*f*) Assemble oiler assembly (1 through 15) on the bench, then install through holes provided in air cylinder. Fill oiler with recommended lubricant.

(2) Refer to paragraph 4-49 for installing pump. After installation, test pump for correct operation. Refer to paragraph 2-8.

Section III. OIL AND GREASE DISPENSERS

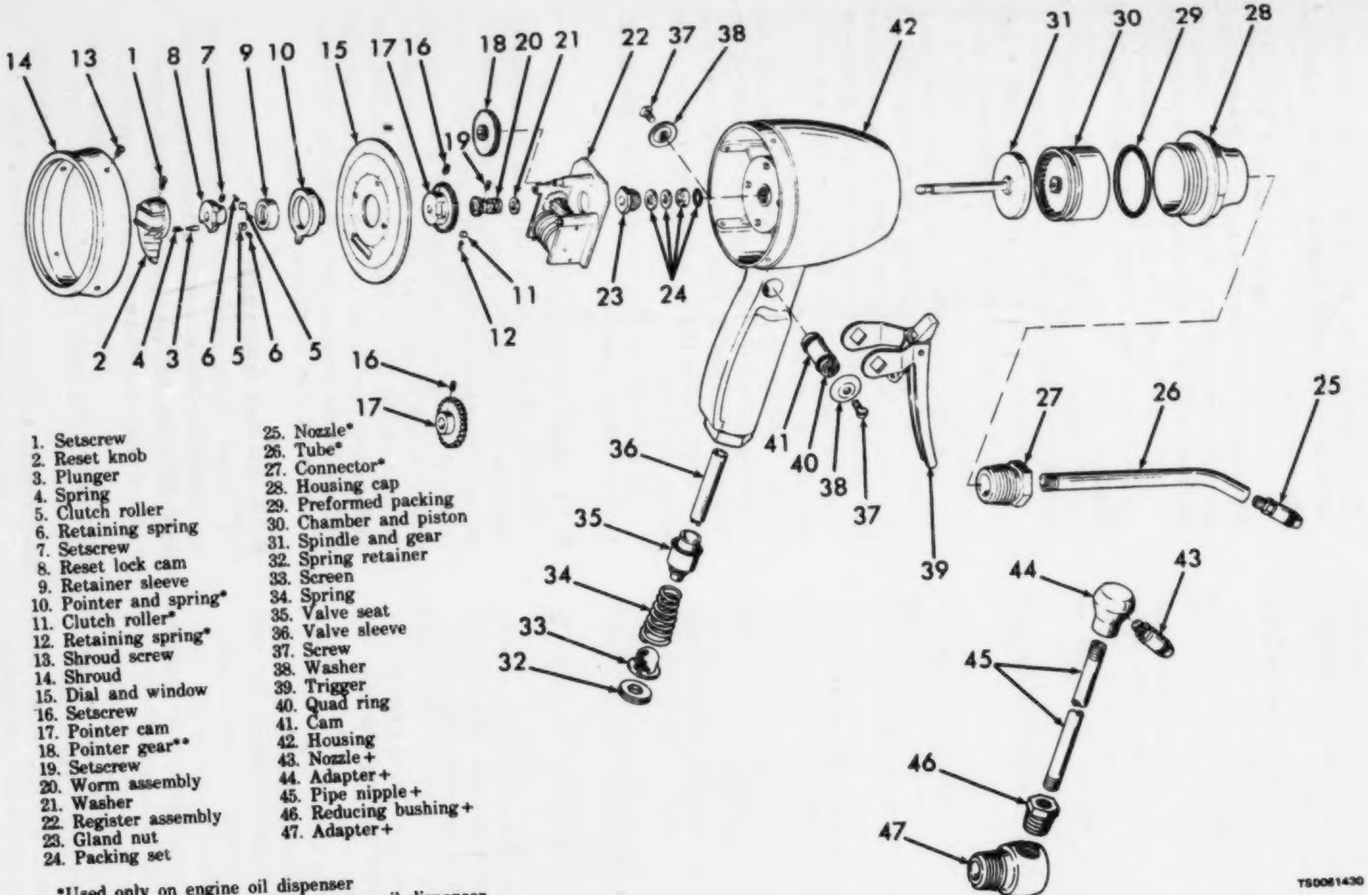
6-9. Description

a. Oil Dispensers. The engine oil and gear oil dispensers are trigger-operated devices which measure and indicate the amount of oil dispensed. They are equipped with settable pointers which can be reset to zero for each subsequent use of the dispensers. The engine oil dispenser measures and meters in quarts while the gear oil dispenser measures and meters in pints.

b. Grease Dispenser. The high pressure grease dispenser controls the amount of grease dispensed from the lubricating unit. The dispenser trigger ca be operated to deliver a single shot of lubricant or continuous flow. Lubricant flow and trigger are ad justable to handle many types of semi-flui lubricants.

6-10. Engine Oil Dispenser

a. Repair. The following repairs can be mad without completely disassembling the dispense Refer to figure 6-4 and disassemble as indicated.



1. Setscrew
2. Reset knob
3. Plunger
4. Spring
5. Clutch roller
6. Retaining spring
7. Setscrew
8. Reset lock cam
9. Retainer sleeve
10. Pointer and spring*
11. Clutch roller*
12. Retaining spring*
13. Shroud screw
14. Shroud
15. Dial and window
16. Setscrew
17. Pointer cam
18. Pointer gear**
19. Setscrew
20. Worm assembly
21. Washer
22. Register assembly
23. Gland nut
24. Packing set
25. Nozzle*
26. Tube*
27. Connector*
28. Housing cap
29. Preformed packing
30. Chamber and piston
31. Spindle and gear
32. Spring retainer
33. Screen
34. Spring
35. Valve seat
36. Valve sleeve
37. Screw
38. Washer
39. Trigger
40. Quad ring
41. Cam
42. Housing
43. Nozzle+
44. Adapter+
45. Pipe nipple+
46. Reducing bushing+
47. Adapter+

*Used only on engine oil dispenser
**Replaced with register gear on gear oil dispenser
+Used only on gear oil dispenser

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Figure 6-4. Oil dispenser, exploded view.

(1) If lubricant leaks between housing cap (28) and housing (42), replace preformed packing (29).

(2) If lubricant leaks around trigger (39), replace quad rings (40) on cam (41).

(3) If lubricant fails to shut off when trigger is released, replace valve seat (35).

(4) If lubricant leaks around dial, disassemble as necessary to replace packing set (24).

b. Disassembly. Refer to figure 6-4 and proceed as follows:

(1) Loosen setscrew (1, fig. 6-4) and remove reset knob (2). When removing the reset knob, take care to prevent losing the plunger (3), spring (4), clutch rollers (5), and retaining springs (6) which are released as knob is removed.

(2) Loosen setscrew (7) and remove reset lock cam (8).

(3) Remove retainer sleeve (9).

(4) Remove the pointer and spring (10). Take care to prevent losing the clutch roller (11) and retaining spring (12) which are released as the pointer is removed.

(5) Remove the four screws (13) securing the shroud (14) to the housing; remove the shroud and dial (15).

(6) Loosen setscrew (16) and remove the pointer cam (17). Remove pointer gear (18).

(7) Loosen setscrew (19) and remove worm assembly (20) and washer (21). Lift out the register assembly (22).

(8) Unscrew packing gland nut (23) and remove packing set (24).

(9) Remove oil dispensing nozzle (25), tube (26), and connector (27).

(10) Using wrench flats provided, unscrew housing cap (28) and remove packing (29), chamber and piston (30), and spindle and gear (31).

(11) To remove the spring retainer (32), use an allen key inserted into the handle to unscrew the retainer and release the screen (33), spring (34), valve seat (35), and valve sleeve (36).

(12) When removing the trigger (39), remove the screws (37) and washers (38); spread the trigger yoke to disengage it from the square bosses on the cam (41).

c. Cleaning and Inspection.

(1) Discard and replace packing set, quad rings, and preformed packing.

(2) Clean all parts with dry cleaning solvent (fed. spec. P-D-680).

(3) Inspect the dial and window for cracks, scratches, and illegible markings. Replace a damaged dial and window.

(4) Inspect the register assembly for catching and binding operation. The gears must rotate freely and without restriction. Check that the number dial markings are legible and clear. Replace if damaged.

(5) Inspect gears for chipped or broken teeth.

(6) Inspect and replace any worn, leaking or damaged parts.

d. Reassembly. Reassembly is essentially the reverse of disassembly. Note the following:

(1) During reassembly, you should apply a light coating of engine oil on the preformed packing and packing set.

(2) Apply a light coat of grease to all gear teeth.

(3) You must install the clutch roller (11) and retaining spring (12) in the notch of the pointer cam (17) before installing the pointer and spring (10). Hold the parts in place as the pointer and spring assembly is positioned on the cam.

(4) Position the two clutch rollers (5) and retaining springs (6) in the notches of the reset lock cam and hold them in place as the reset knob (2) is positioned on the cam. Tighten the setscrew (1) to secure the knob.

(5) After reassembly, you should test the dispenser for correct operation.

6-11. Gear Oil Dispenser

The gear oil dispenser is similar to the engine oil dispenser except that the gear oil dispenser does not use an inner pointer (10, fig. 6-4), clutch roller (11), or retaining spring (12), and a register gear is used in place of a pointer cam (17). All other components are the same except for the dispensing nozzles. The gear oil dispenser uses nozzle (43), adapter (44), pipe nipple (45), reducer bushing (46), and adapter (47). Refer to paragraph 6-10 for instructions.

6-12. Grease Dispenser

a. Repair. Some repairs to the grease dispenser are possible without complete disassembly of the unit. Refer to figure 6-5 and proceed as follows:

1. Retaining nut
2. Thrust spacer
3. Packing
4. Ball
5. Terminal stem
6. Body
7. Packing
8. Thrust spacer
9. Retaining nut
10. Ball
11. Body and stem
12. Thrust spacer
13. Packing
14. Retaining nut
15. Ball
16. Terminal stem
17. Hand grip
18. Backup washer
19. Spring
20. Ball guide
21. Ball
22. Gasket
23. Ball seat insert
24. Gasket
25. Hydraulic coupler
26. Extension tube
27. Retaining ring
28. Washer
29. Adjusting screw
30. Spring
31. Nut
32. Setscrew
33. Pin
34. Trigger
35. Plunger
36. Packing screw
37. Washer
38. Packing
39. Body

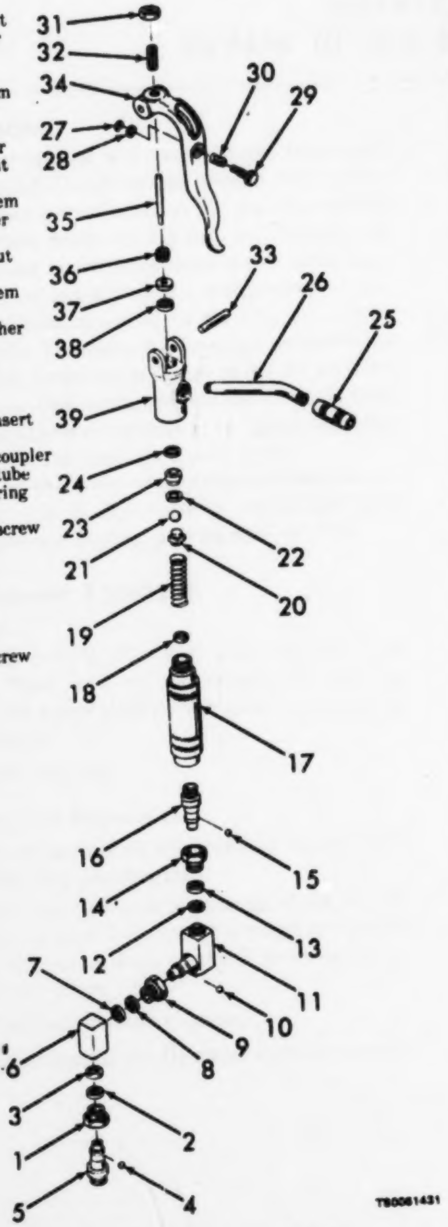


Figure 6-5. Grease dispenser, exploded view.

(1) To adjust trigger, loosen lock nut (31) and back out setscrew (32) approximately one quarter turn or until handle has 1/2 inch travel.

(2) To replace ball seat insert (23) and ball (21), proceed as follows:

(*a*) Place dispenser in vise, then unscrew hand grip (17) from body and remove spring (19).

(*b*) Tap out ball (21), ball guide (20) and ball seat insert (23).

(*c*) Replace ball seat insert (23) and ball (21). Clean dispenser thoroughly and reassemble making sure new gaskets are placed in proper position before hand grip is replaced.

(3) To replace V-packing (38), proceed as follows:

(*a*) Place dispenser in vise and unscrew tube (26) from body (39).

(*b*) Remove trigger pin (33) and trigger (34).

(*c*) Unscrew packing screw (36), remove washer (37), and pull out V-packing (38) with a small hook.

(*d*) Replace packing, washer, and packing screw, and install plunger (35).

NOTE

Do not tighten packing screw until plunger has been installed. The packing screw has a screwdriver slot.

(*e*) Replace trigger, pin, and tube. Adjust trigger and dispenser is ready for use.

(4) If further repair or overhaul is required, disassemble per subparagraph *b* below.

b. Disassembly. Refer to figure 6-5 and proceed as follows:

(1) Remove the high pressure swivel assembly (items 1 through 16) from the hand grip (17). You should not disassemble the high pressure swivel unless there is evidence of malfunction. If disassembly is required, take care not to lose the balls (4, 10, and 15) as you remove retaining nuts (1, 9, and 14), spacers (2, 8, and 12), and packings (3, 7, and 13). Eight balls are used at each location.

(2) Refer to ball seat insert replacement instructions in subparagraph *a*(2) above and proceed as instructed to remove items 17 through 24.

(3) Refer to V-packing replacement instructions in subparagraph *a*(3) above and proceed as instructed to remove items 25 through 38.

(4) When necessary, disassemble the trigger (34) by removing retaining ring (27), washer (28), adjusting screw (29), spring (30), nut (31), and setscrew (32).

c. Cleaning and Inspection.

(1) Clean all parts with dry cleaning solvent (fed. spec. P-D-680).

(2) Inspect and replace any worn, leaking, cracked, or damaged parts.

(3) Inspect threaded surfaces for stripped or cross threads. If beyond repair, replace.

d. Reassembly. Reassembly is essentially the reverse of disassembly. Note the following:

(1) During reassembly you should apply a light coating of engine oil on the V-packing and the quad rings on the trigger pin.

(2) Do not tighten the packing screw (36) unless the valve stem is inserted. The screw has a screwdriver slot at the top.

(3) After reassembly you should test the dispenser for correct operation.

CHAPTER 7
REPAIR OF AIR COMPRESSOR

7-1. Description.

a. The air compressor is a two-cylinder, two-stage, vertical, air-cooled, V-belt driven unit. It will deliver 15 cfm (cubic feet per minute) at 175 psi (pounds per square inch) when driven at 735 rpm (revolutions per minute). Constant speed unloading is provided. Constant speed operation allows the compressor to run continuously without stopping or starting the engine after each cycle. The compressor stops compressing air and runs free until the pressure in the air receiver has dropped to a predetermined setting at which time the compressor starts compressing air again until the pressure reaches its predetermined limit.

b. Removal of the compressor from the lubricating and servicing unit is described in paragraph 4-42. Remove compressor piping per paragraph 4-46.

7-2. Compressor Flywheel.

a. Removal.

(1) Loosen nut (1, fig. 7-2) and bolt (2). Pull flywheel (3) from end of crankshaft. It may be necessary to pry apart slightly the split in the hub to facilitate removal.

(2) Remove key (4).

b. Cleaning and Inspection.

(1) Clean all parts with dry cleaning solvent (fed. spec. P-D-680). Dry thoroughly.

(2) Inspect the flywheel for cracks, chips, distortion and wear. Inspect V-grooves for rough or chipped areas where excessive wear to the V-belts could occur. File off all burrs.

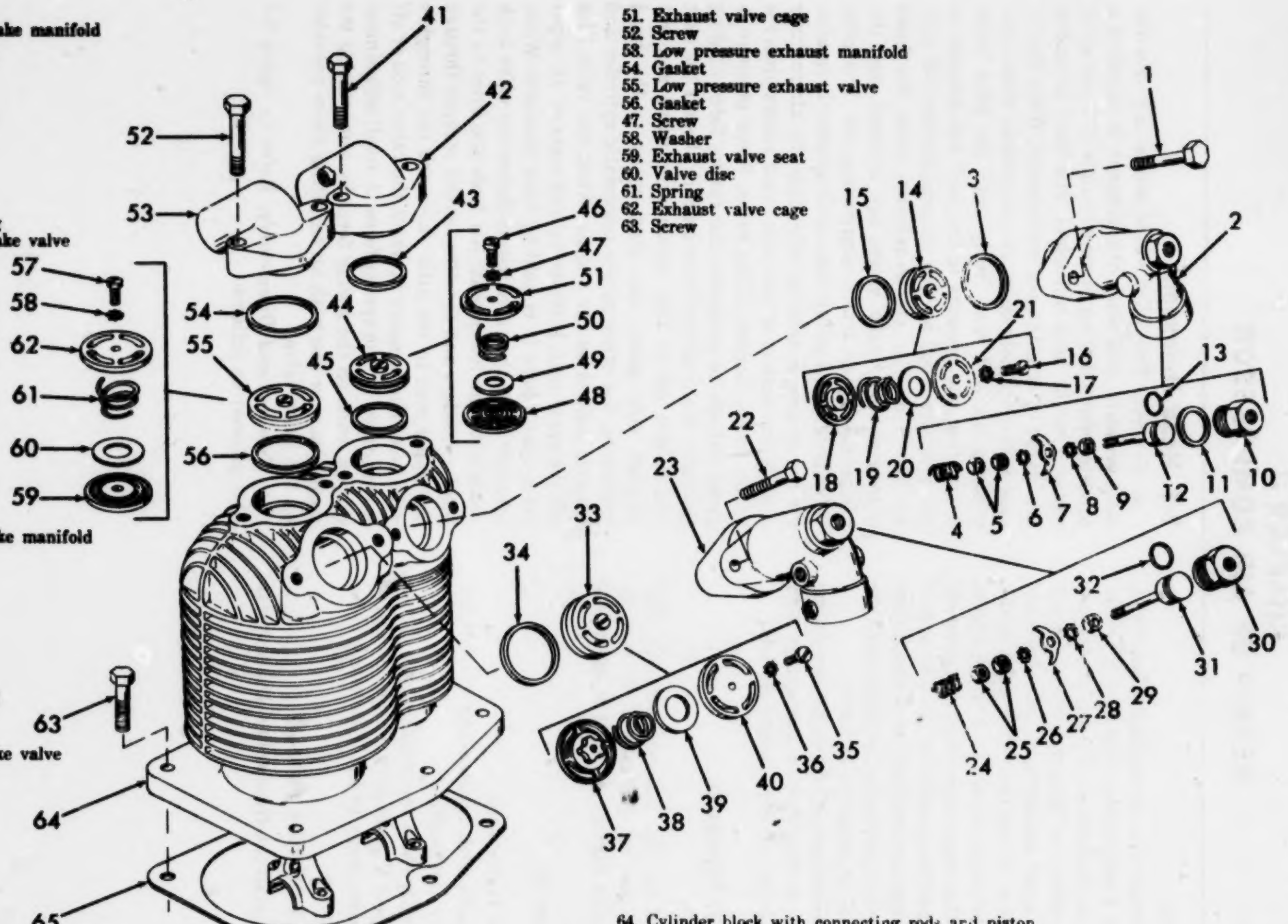
(3) Replace all defective parts.

c. Installation. Install the flywheel as illustrated in figure 7-2.

7-3. Head Unloaders.

a. General. The pilot valve senses air receiver tank pressure, and when the pressure is raised to a predetermined setting (approximately 175 psi) air is released to the head unloaders. The head unloaders are intake valve hold-open mechanisms. When the intake valves are held open, the compressor stops compressing air and runs freely until the pilot valve senses that the pressure in the tank has dropped to the predetermined setting (approximately 145 psi). At this time the air is released from the head unloaders, the intake valves are released, and the compressor again starts compressing air. The pilot valve is designed to function as an automatic on-and-off air switch. A sensing tube from the air receiver tank to the bottom of the pilot valve allows pressure to act on the bottom of the valve. When pressure is great enough to overcome the spring force holding the valve down on the lower seat, it lifts off the seat and allows air to flow around the valve and out through side ports. One port opens to the head unloaders, the other to the pneumatic cylinder and throttle control on the engine. When the valve lifts off the lower seat, it moves up and seats on an upper valve seat where it is held by tank pressure. When pressure falls, the valve spring forces the valve back down onto the lower seat. Air from the lines to the head unloaders and throttle control escapes through the upper seat in the pilot valve and out through a vent hole. The pressure at which the valve is on or off is controlled by the spring force. A small adjustment can be made on the spring force by compressing the spring more or less with an adjusting screw provided on the pilot valve.

b. Removal and Disassembly. Refer to figure 7-1 and proceed as follows:



1. Screw
2. High pressure intake manifold
3. Gasket
4. Spring
5. Lock nut
6. Washer
7. Claw
8. Washer
9. Nut
10. Cylinder body
11. Gasket
12. Piston
13. Preformed packing
14. High pressure intake valve
15. Gasket
16. Screw
17. Washer
18. Intake valve cage
19. Spring
20. Valve disc
21. Intake valve seat
22. Screw

23. Low pressure intake manifold
24. Spring
25. Lock nut
26. Washer
27. Claw
28. Washer
29. Nut
30. Cylinder body
31. Piston
32. Preformed packing

33. Low pressure intake valve
34. Gasket
35. Screw
36. Washer
37. Intake valve cage
38. Spring
39. Valve disc
40. Intake valve seat
41. Screw

42. High pressure exhaust manifold
43. Gasket
44. High pressure exhaust valve
45. Gasket
46. Screw
47. Washer
48. Exhaust valve seat
49. Valve disc
50. Spring

51. Exhaust valve cage
52. Screw
53. Low pressure exhaust manifold
54. Gasket
55. Low pressure exhaust valve
56. Gasket
47. Screw
58. Washer
59. Exhaust valve seat
60. Valve disc
61. Spring
62. Exhaust valve cage
63. Screw

64. Cylinder block with connecting rods and piston
65. Gasket

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Figure 7-1. Intake and exhaust manifolds, unloaders, and valves, exploded view.

(1) Remove the screws (1) and high pressure intake manifold (2). Remove spring (4).

(2) Disassemble the manifold by removing nuts (5), washer (6), claw (7), washer (8), and nut (9) from the rod end of the piston (12). Remove the cylinder body (10), gasket (11), piston (12), and packing (13) from the top of the unloader manifold.

(3) Remove the screws (22) and remove the low pressure intake manifold (23). Remove spring (24).

(4) Disassemble the manifold by removing nuts (25), washer (26), claw (27), washer (28), and nut (29) from the rod end of the piston (31). Remove the cylinder body (30), piston (31), and packing (32) from the top of the unloader manifold.

c. Cleaning and Inspection.

(1) Discard and replace gaskets and preformed packings.

(2) Clean the head unloader parts with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

(3) Inspect all parts for cracks, breaks, wear, distortion, and other damage. Replace damaged or defective parts.

d. Reassembly and Installation.

(1) Prior to installation of head unloader in manifold, you should make sure that the actuating claw is positioned so that it will enter two slots in the compressor intake valve. Refer to figure 7-1 and reassemble the head unloaders in the reverse order of disassembly. Note the position of the slots in the compressor intake valve (14 or 33) and rotate the actuating claw (7 or 27) to corresponding position. When the head unloader piston (12 or 31) is in uppermost position, the claw should protrude 1/16 inch below the bottom of the manifold (2 or 23).

(2) Holding the piston return spring (4 or 24) in position on the actuating claw with one finger, place head unloader manifold in position over compressor intake valve. Install screws (1 or 22) drawing up on both sides a little at a time to insure proper entry of manifold into compressor valve well. To check for correct positioning of actuating claw, you should place a blunt instrument in the opening at the top of the cylinder body and push down on piston. If correctly installed, piston will move down and the spring will return it.

(3) Tighten manifold cap screws (1 or 22) to a maximum of 45 foot-pounds torque.

7-4. Exhaust Manifolds

a. Removal. Remove the exhaust manifolds (42 and 53, fig. 7-1) by removing screws (41 and 52).

b. Cleaning and Inspection.

(1) Clean all parts with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

(2) Inspect the manifolds for cracks, breaks, or dents. Inspect all threaded fittings for damaged threads.

(3) Replace all defective parts.

c. Installation. Install the exhaust manifolds (42 and 53) as illustrated in figure 7-1. You should tighten manifold cap screws (41 and 52) to a maximum of 45 foot-pounds torque.

7-5. Intake and Exhaust Valves

a. Removal and Disassembly.

(1) Remove the head unloaders (para 7-3) and the exhaust manifolds (para 7-4).

(2) Remove high pressure intake valve (14, fig. 7-1), low pressure intake valve (33), high pressure exhaust valve (44), low pressure exhaust valve (55), and the related gaskets.

NOTE

When a valve assembly is removed, you should tag it for identification of cylinder and whether it is an intake or exhaust valve.

(3) Disassembly of the four valves is similar. Remove screws (16, 35, 46, and 57) and washers (17, 36, 47, and 58). Separate the valve cages (18, 37, 51, and 62) and valve seats (21, 40, 48, and 59) and remove springs (19, 38, 50, and 61) and valve discs (20, 39, 49, and 60).

b. Cleaning and Inspection.

(1) Discard and replace all gaskets each time valves are removed or disassembled.

(2) Clean all remaining parts with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

(3) Inspect all valve seats and cages for cracks, breaks, rough or scored seats, and mating surfaces. Replace if defective.

(4) Inspect the springs for distortion, weakness, or broken coils. Replace if defective.

c. Reassembly and Installation.

(1) Refer to figure 7-1 and reassemble and install the intake and exhaust valves in the reverse order of disassembly and removal. Be sure you replace valve assembly in the same cylinder from which it was removed. Do not interchange intake valves and exhaust valves or their parts.

(2) Install the head unloaders (para 7-3).

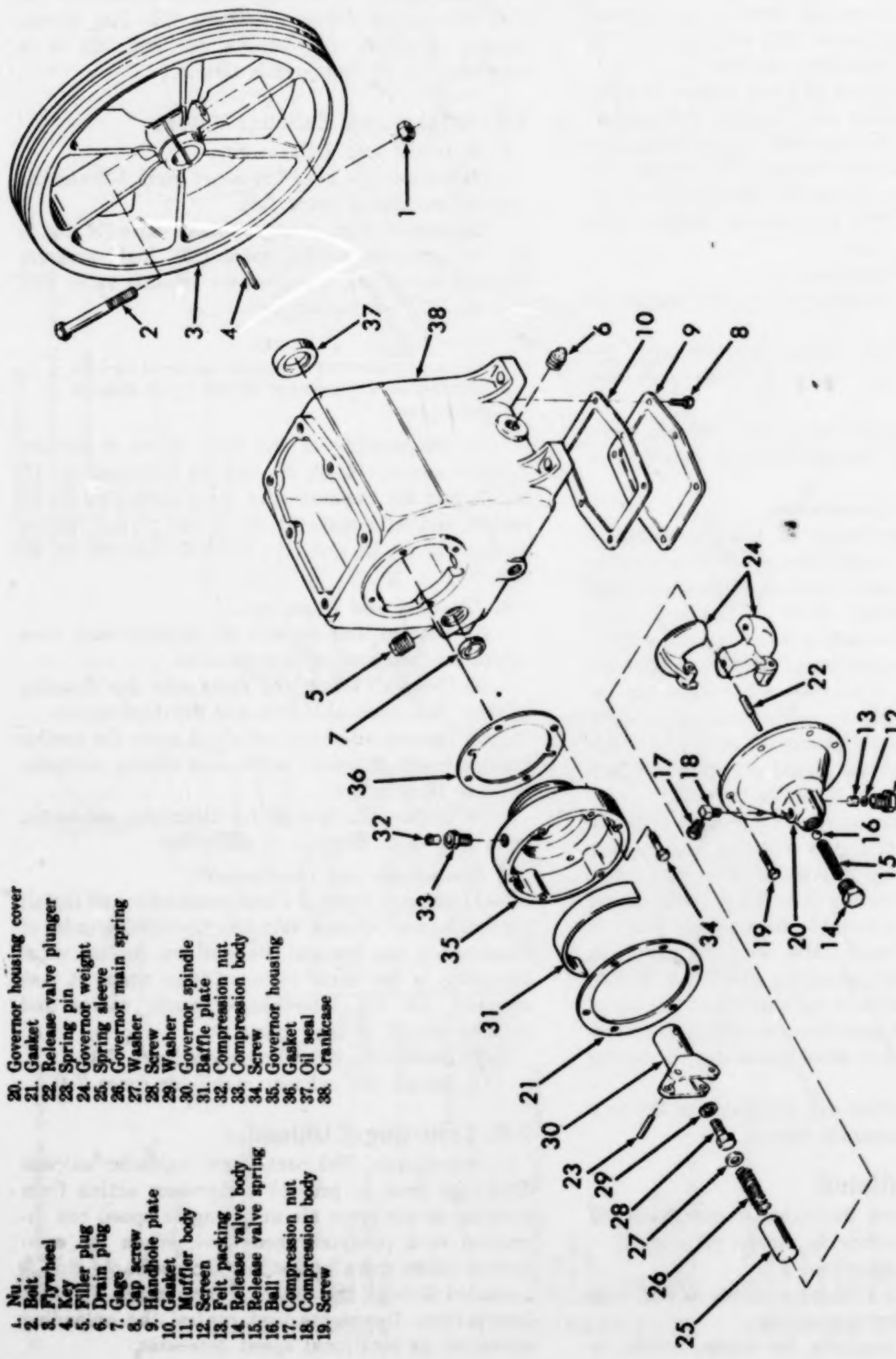
(3) Install the exhaust manifolds (para 7-4).

7-6. Centrifugal Unloader

a. Description. The centrifugal unloader unloads discharge lines to prevent compressor action from starting to compress air until engine speed has increased to a predetermined level. When the compressor slows down and stops, the discharge line is unloaded through the centrifugal unloader. The unit incorporates flyweights that control the unloading operation as rotational speed decreases.

b. Removal and Disassembly.

(1) Remove muffler body (11, fig. 7-2), screen (12), and felt packing (13) from governor housing cover (20).



1. Nut
2. Bolt
3. Flywheel
4. Key
5. Filler plug
6. Drain plug
7. Gage
8. Cap screw
9. Handhole plate
10. Gasket
11. Muffler body
12. Screen
13. Felt packing
14. Release valve body
15. Release valve spring
16. Ball
17. Compression nut
18. Compression body
19. Screw
20. Governor housing cover
21. Gasket
22. Release valve plunger
23. Spring pin
24. Governor weight
25. Spring sleeve
26. Governor main spring
27. Washer
28. Screw
29. Washer
30. Governor spindle
31. Baffle plate
32. Compression nut
33. Compression body
34. Screw
35. Governor housing
36. Gasket
37. Oil seal
38. Crankcase

Figure 7-2. Flywheel, crankcase, and centrifugal unloader, exploded view.

(2) Carefully unscrew spring-loaded release valve body (14) and remove spring (15) and ball (16). Remove nut (17) and body (18).

(3) Remove six screws (19) that secure the cover (20) to the governor housing; remove cover and gasket (21). Remove the release valve plunger (22) from the governor housing cover.

(4) Drive out spring pins (23) and remove governor weights (24). Remove spring sleeve (25), main spring (26), and washer (27).

(5) Remove the spindle (30) from the crankshaft by removing screw (28) and washer (29).

(6) Remove baffle plate (31), nut (32) and body (33) from governor housing. Remove four screws (34) that secure governor housing to crankcase (38); remove housing (35) and gasket (36).

c. Cleaning and Inspection.

(1) Discard and replace all gaskets.

(2) Clean all parts with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

(3) Inspect the springs for loss of tension and set. Replace if defective.

(4) Inspect the housing cover, baffle plate, and housing for cracks, breaks, damaged threads, or other damage. Replace if defective.

(5) Inspect the plunger, sleeve, governor pin, spindle, and weights for cracks, nicks, burrs, wear, or other damage. Replace all damaged or worn parts.

(6) Inspect all hardware for breaks, distortion, or damaged threads. Replace all damaged hardware.

d. Reassembly and Installation.

(1) Carefully install the housing (35, fig. 7-2). Do not install the housing gaskets (36) at this time. Attach the housing to the crankcase (38) with one screw (34) at the top and one screw at the bottom. You should make certain that the main bearing cup (11, fig. 7-3), on the end of the crankshaft, fits properly in the housing. Set the two attaching screws finger tight. Use feeler gage and measure the gap between housing and crankcase at top and bottom. Average the two dimensions and add 0.005 inch to determine the selection of housing gaskets to use. A combination of gaskets should equal the total determined above. This procedure will minimize crankshaft end play.

(2) Remove housing from crankcase and install housing gaskets as determined above. Install housing and secure with attaching screws. Tighten screws to a maximum of 25 foot-pounds torque.

(3) Reassemble the balance of centrifugal unloader in the reverse order of disassembly as illustrated in figure 7-2.

7-7. Handhole Plate and Gasket

a. Removal.

(1) Drain oil from crankcase by removing oil drain plug (6, fig. 7-2).

(2) Remove handhole plate (9) and gasket (10).

b. Cleaning and Inspection.

(1) Discard and replace the handhole plate gasket.

(2) Clean handhole plate with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

(3) Inspect for cracks, breaks, and dents. Straighten out minor dents. Replace if defective.

c. Installation. Install the handhole plate (9) and new gasket (10) with its attaching screws (8). Tighten screws to a maximum of 25 foot-pounds torque.

7-8. Pistons, Piston Rings, Connecting Rods, and Cylinder Block

a. Removal and Disassembly.

(1) Remove oil drain plug (6, fig. 7-2) and drain oil.

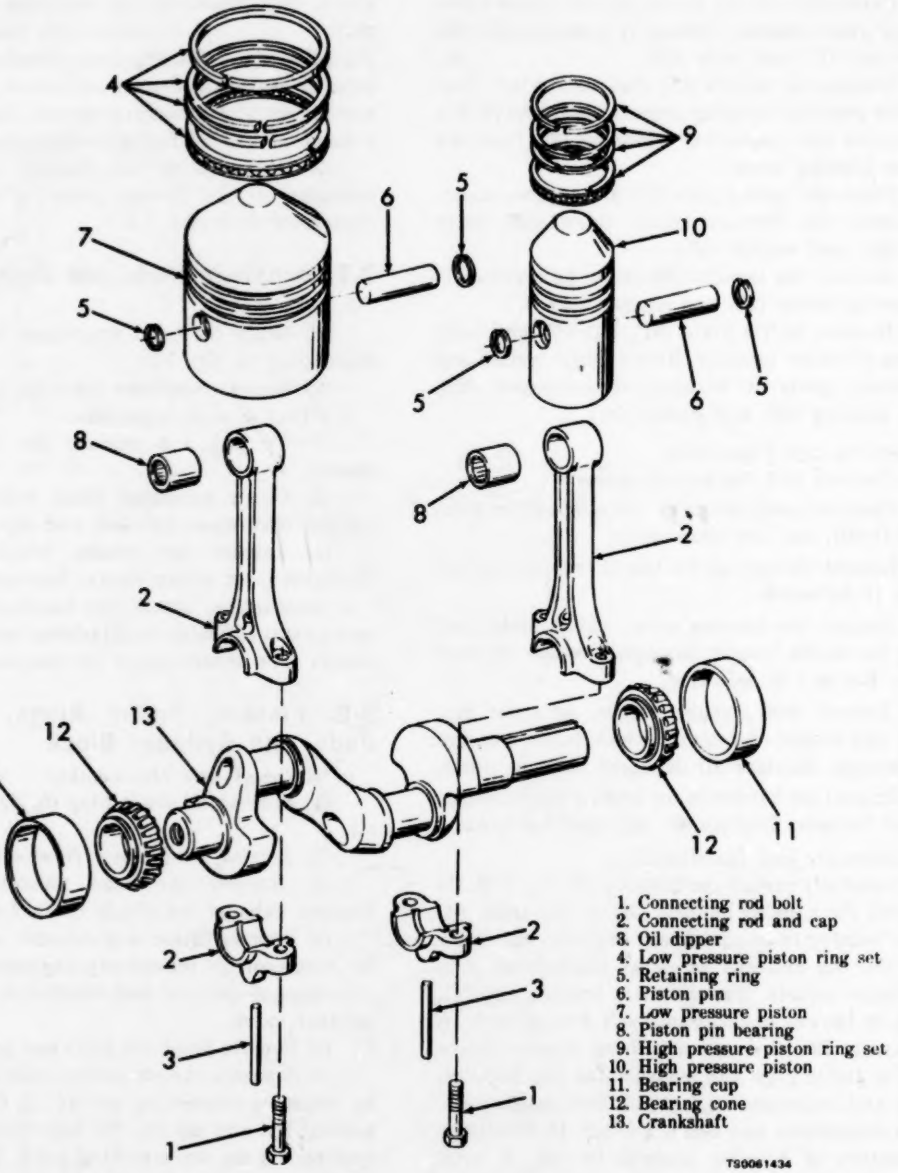
(2) Remove compressor flywheel (para 7-2).

(3) Remove the head unloaders (para 7-3). Remove exhaust manifolds (para 7-4).

(4) Remove intake and exhaust valves (para 7-5). To insure correct reassembly, tag each valve for identification of cylinder and whether it is an intake or exhaust valve.

(5) Remove handhole plate and gasket (para 7-7).

(6) Separate the connecting rods from crankshaft by removing connecting rod bolt (1, fig. 7-3) and connecting rod and cap (2). The connecting rod and connecting rod cap are matching parts. Tag cap and rod for identification to aid reassembly.



1. Connecting rod bolt
2. Connecting rod and cap
3. Oil dipper
4. Low pressure piston ring set
5. Retaining ring
6. Piston pin
7. Low pressure piston
8. Piston pin bearing
9. High pressure piston ring set
10. High pressure piston
11. Bearing cup
12. Bearing cone
13. Crankshaft

Figure 7-3. Compressor crankshaft, pistons, and connecting rods, exploded view.

(7) Remove the six cap screws (63, fig. 7-1). Remove the cylinder block (64) with the pistons and connecting rods in it, and remove gasket (65) from the crankcase.

(8) Pull the assembled pistons and connecting rods from the cylinder block.

(9) Refer to figure 7-3 and disassemble the pistons and connecting rods as follows:

NOTE

Tag all parts to insure correct reassembly.

(*a*) Remove retaining rings (5) and push piston pins (6) through pistons. Remove pistons (7 and 10) from connecting rods. Do not remove piston pin bearings (8) from connecting rods unless inspection indicates that they are worn or damaged.

(*b*) Remove ring sets (4 and 9) taking care not to expand rings more than necessary when removing from pistons.

b. Cleaning, Inspection, and Repair.

NOTE

Refer to table 7-1 for compressor repair and replacement standards.

(1) Clean all parts with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

(2) Inspect the cylinder for broken cooling fins and cracks; replace a damaged cylinder.

(3) Inspect the cylinder bore for wear, scoring, pitting, or other damage. Inspect the bores for out-of-roundness by placing an inside micrometer in the top of the cylinder bore and taking two measurements, 90 degrees apart. Repeat the procedure halfway down the bore. The difference between the two measurements is the amount the bore is out of round. Replace or resize the cylinder if out-of-roundness is over 0.002 inch.

(4) Measure the clearance of the piston pin in the piston pin bushing. Desired clearance is 0.0002 and 0.0009 inch. Maximum allowable piston pin clearance is 0.001 inch.

(5) Inspect the connecting rods for visible damage or misalinement. Realine slightly twisted rods or replace if they are badly damaged.

(6) Place the piston rings in the cylinder bore in which they will be used and measure the ring gap with a feeler gage. Position the piston ring square with the cylinder bore about one half inch from the top. The correct gap for the small compression and oil rings is 0.0012±0.005 inch.

(7) If the ring gap is less than the specified width, you should file across the butt ends of the ring to increase the gap to the required tolerance. If the ring gap is greater than 0.023 inch for any ring, replace the entire set of rings.

(8) Measure the ring groove in the pistons for wear and side clearance, using a feeler gage between the ring and groove side wall. The desired ring groove clearance is 0.0010 to 0.0025 inch for the low-pressure rings and 0.0010 to 0.0045 inch for the high-pressure rings.

c. Reassembly and Installation.

NOTE

Refer to table 7-1 for compressor repair and replacement standards.

(1) Refer to figure 7-3 and reassemble the pistons and connecting rods in the reverse order of disassembly. Lubricate each piston and connecting rod assembly with a light coat of engine oil.

(2) Install the assembled pistons and connecting rods into the cylinder block. Install the cylinder block assembly (64, fig. 7-1) and gasket (65) on the crankcase. Tighten the cylinder block screws to 45 foot-pounds torque.

(3) Attach connecting rods to crankshaft and secure with connecting rod and cap (2, fig. 7-3) and connecting rod bolt (1). Make sure the caps are fitted to the rods from which they were removed. The connecting rod cap and connecting rod are matched parts and should not be interchanged. Tighten bolts to 25 foot-pounds maximum.

(4) Install the intake and exhaust valves (para 7-5).

(5) Install the exhaust manifolds (para 7-4) and head unloaders (para 7-3).

(6) Install the handhole plate and new gasket (para 7-7).

(7) Install compressor flywheel (para 7-2).

(8) Install the oil drain plug (6, fig. 7-2).

7-9. Crankshaft, Bearings, and Oil Seal

a. Removal and Disassembly.

(1) Remove oil drain plug (6, fig. 7-2) and drain oil.

(2) Remove compressor flywheel (para 7-2).

(3) Remove handhole plate and gasket (para 7-7).

(4) Remove the centrifugal unloader (para 7-6).

(5) Remove the connecting rod caps (2, fig. 7-3). The connecting rods are accessible through the handhole plate in the bottom of the crankcase (38, fig. 7-2). The caps are matched with the connecting rod. Tag the cap to identify it with appropriate rod to insure correct reassembly.

(6) Remove the crankshaft from the crankcase as illustrated in figure 7-3. The bearing cones and rollers (12) are pressed on the shaft and will come out with the crankshaft.

(7) Place the crankshaft (13, fig. 7-3) in a suitable press and carefully remove the two tapered bearing cones and rollers (12) from the crankshaft.

(8) Using a blunt instrument, drive the bearing cup (11) and oil seal (37, fig. 7-2) out of the flywheel side of the crankcase. Discard oil seal. Remove the bearing cup (11, fig. 7-3) from the governor housing (35, fig. 7-2).

b. Cleaning, Inspection and Repair.

NOTE

Refer to table 7-1 for compressor repair and replacement standards.

(1) Clean all parts except the bearings with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

(2) Place the bearings in a wire basket, dip in dry cleaning solvent and dry with low pressure compressed air. Do not spin the rollers. Dip in light oil.

(3) Inspect the bearings for free and even rotation. Replace if defective.

(4) Inspect the crankshaft for cracks, scores, and distortion. You should measure the crankshaft bearing journals for wear, using an outside micrometer. If the shaft measures more than 0.0005 out-of-round, metallize the crankshaft and turn down to correct size. The correct size for main bearing journals is 1.376 to 1.377 inches. The correct size for connecting rod journals is 1.623 to 1.625 inches.

(5) Inspect the bearing cups for scores, burrs,

pits, or burned surfaces. Replace defective bearing cups.

(6) Inspect the crankcase for breaks, cracks, chips, or other defects. Replace if defective.

c. Reassembly and Installation.

(1) Use a suitable bearing cup driver to press the bearing cup (11, fig. 7-3) and a new oil seal (37, fig. 7-2) into the crankcase (38). Install the remaining bearing cup in the governor housing (35) in the same manner.

(2) Press the tapered bearing cones and rollers (12, fig. 7-3) on the crankshaft (13). You should make certain that cones and rollers are seated firmly against the crankshaft shoulders to insure a correct reading when determining crankshaft end play.

(3) Install the assembled crankshaft and tapered bearing cones and rollers in the crankcase.

(4) Install the centrifugal unloader (para 7-6). Be sure you adjust crankshaft end play when installing the unloader.

(5) Install pistons, piston rings, connecting rods, and cylinder block (para 7-8).

(6) Install handhole plate and new plate gasket (para 7-7).

(7) Install the oil drain plug in the crankcase.

(8) Install flywheel (para 7-2).

(9) Install compressor (para 4-42).

(10) Install tube assemblies (para 4-46).

7-10. Repair and Replacement Standards

Table 7-1 lists manufacturer's sizes, tolerances, desired clearances, and maximum allowable wear and clearances.

Table 7-1. Compressor Repair and Replacement Standards

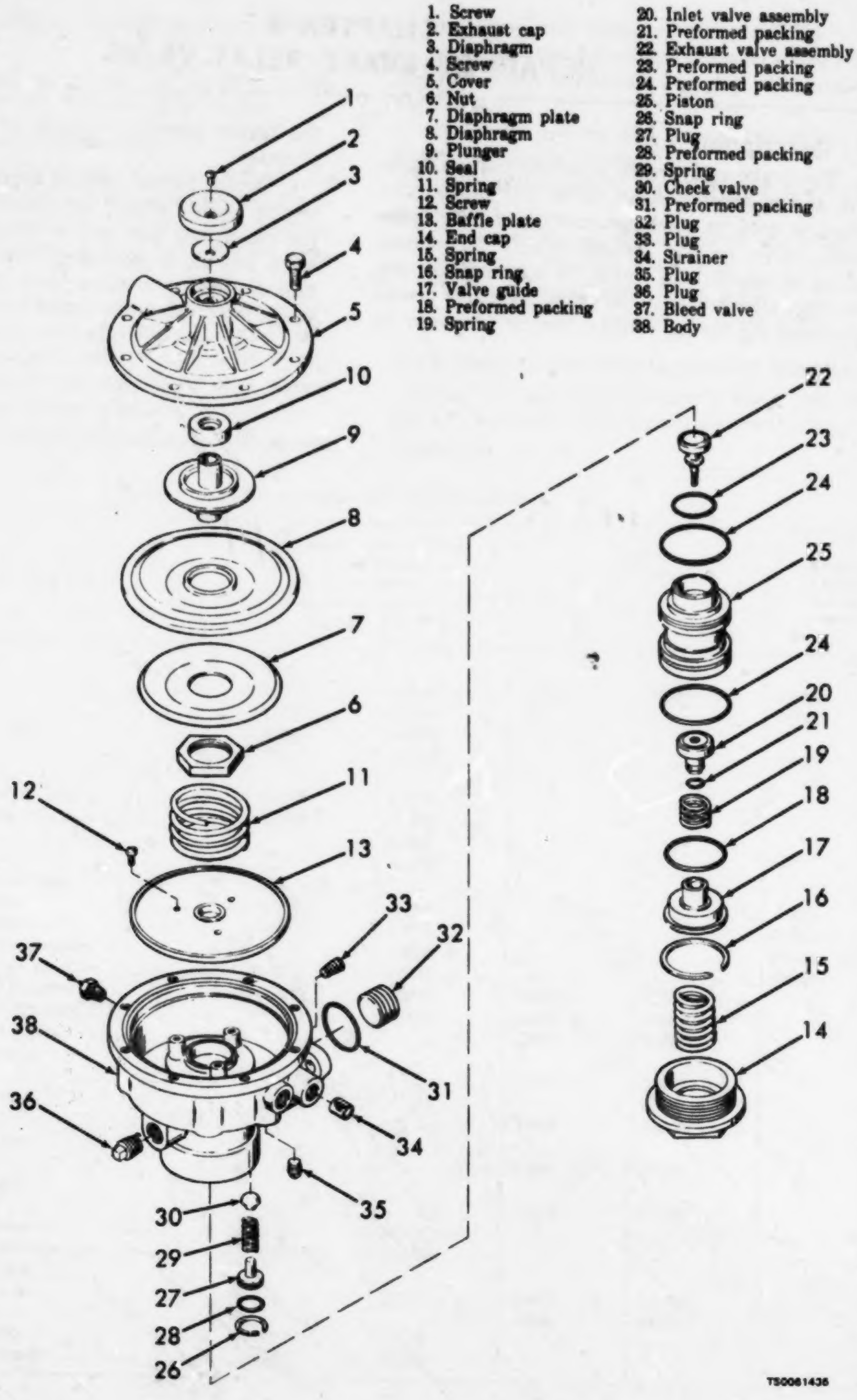
Points of measurement	Manufacturer's dimensions and tolerances in inches		Desired clearance		Maximum allowable wear and clearance
	Min.	Max.	Min.	Max.	
Cylinders:					
Bore, low pressure	4.6250	4.6250	0.0020	0.0030	0.0060
Bore, high pressure	2.5000	2.5005			0.0060
Taper	0.0010	0.0010			
Out-of-round	0.0010	0.0010			0.0020
Crankshaft:					
Journal size, main bearing	1.3760	1.3770			
Journal size, connecting rod	1.6230	1.6250			
Journal out-of-round		0.0005			
Journal taper		0.0002			
Pistons, piston pins, piston rings:					
Piston size, low pressure	4.6195	4.6200			0.0015
Piston size, high pressure	2.4970	2.4975			0.0015
Piston pin diameter, low pressure	0.8122	0.8125			0.0010
Piston pin diameter, high pressure	0.8122	0.8125			0.0010
Piston pin length, low pressure	2.1250	2.1350	0.0002	0.0009	
Piston pin length, high pressure	2.1250	2.1350	0.0002	0.0009	
Piston pin clearance in piston			0.0002	0.0009	
Piston-to-cylinder clearance, low pressure			0.0050	0.0055	
Piston-to-cylinder clearance, high pressure			0.0025	0.0030	
Piston ring side clearance, low pressure			0.0010	0.0025	
Piston ring side clearance, high pressure			0.0010	0.0045	
Piston ring gap, low pressure	0.0130	0.0230			
Piston ring gap, high pressure	0.0070	0.0170			
Connecting rods and journals:					
Bearing running clearance			0.0003	0.0016	
Bearing side clearance			0.0040	0.0012	
Bearing internal diameter	1.3760	1.3770			
Rod internal diameter (cold)	1.6270	1.6280			

CHAPTER 8
REPAIR OF BRAKE RELAY VALVE

8-1. Description

a. The brake relay valve is a combination brake valve and emergency relay valve. The brake valve section is used in combination with the air brake treadle valve on the towing vehicle for normal braking of vehicle and trailer. It automatically applies the trailer brakes in the event the trailer breaks away from the towing vehicle. The air reservoirs on the trailer provide a supply of air for quick application.

b. During normal braking operation of relay valve, towing vehicle supply air enters the valve through the emergency port and is directed into the reservoirs. The air is prevented from reversing its direction of flow by a check valve (30, fig. 8-1). It also keeps inlet valve (20) closed.



1. Screw
2. Exhaust cap
3. Diaphragm
4. Screw
5. Cover
6. Nut
7. Diaphragm plate
8. Diaphragm
9. Plunger
10. Seal
11. Spring
12. Screw
13. Baffle plate
14. End cap
15. Spring
16. Snap ring
17. Valve guide
18. Preformed packing
19. Spring
20. Inlet valve assembly
21. Preformed packing
22. Exhaust valve assembly
23. Preformed packing
24. Preformed packing
25. Piston
26. Snap ring
27. Plug
28. Preformed packing
29. Spring
30. Check valve
31. Preformed packing
32. Plug
33. Plug
34. Strainer
35. Plug
36. Plug
37. Bleed valve
38. Body

Figure 8-1. Brake relay valve, exploded view.

c. When the towing vehicle air brake treadle is depressed for brake application, air enters the service port and acts against diaphragm (8) and plunger (9). This action moves the plunger against exhaust valve (22), closes the exhaust port in the plunger, and unseats valve (20). With valve unseated, air from the trailer reservoir enters the relay valve and is directed out the delivery ports to apply the brakes.

d. As the towing vehicle air brake treadle is released, the pressure from spring (11) forces the air back through the service port line where it is exhausted through the treadle valve. With the air released above diaphragm (8), the exhaust port in the plunger opens. Spring pressure against the brake chamber diaphragm causes the diaphragm to force the air back through the lines, and into the relay valve. The air exhausts through the top of the relay valve.

e. During emergency operation of the relay valve, when the trailer connections are severed, the trailer reservoir pressure closes the ball check valves in the hoses at the outlet side of the air cleaners. At the same instant, reservoir air pressure, which is greater than the pressure of spring (19), overcomes the spring and permits full reservoir pressure to enter the relay valve. The pressure exits through the delivery ports and applies the brakes.

8-2. Disassembly

a. Remove brake relay valve as instructed in paragraph 4-63.

b. Remove screw (1, fig. 8-1), exhaust cap (2), and diaphragm (3) from cover (5).

c. Remove the cover assembly (items 5 through 10) by removing the eight screws (4) that secure it to the body (38). Disassemble the cover assembly by removing nut (6), diaphragm plate (7), diaphragm (8), plunger (9),,and seal (10).

d. Remove spring (11).

e. Remove the baffle plate (13) from body (38) by removing three screws (12).

f. Unscrew end cap (14) and remove spring (15) and cartridge assembly (items 16 through 22) from relay valve body. Do not disassemble the cartridge assembly unless a malfunction is indicated. When necessary, disassemble the cartridge assembly as follows:

(1) Remove snap ring (16), and then remove valve guide (17), packing (18), and spring (19) from piston (25).

(2) Unscrew exhaust valve assembly (22) from inlet valve assembly (20) and remove both parts.

(3) Remove packings (21, 23, and 24).

g. Remove snap ring (26) and then remove plug (27), packing (28), spring (29), and check valve (30) from relay valve body.

h. Disassemble relay valve body assembly by removing packing (31), plugs (32, 33, 35, and 36), strainer (34), and bleed valve (37).

8-3. Cleaning and Inspection

a. Clean all metal parts with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

b. Inspect castings for damage, cracks, warping, and stripped or crossed threads.

c. Check springs for weakness or distortion.

d. Inspect diaphragms for cracks or deteriorated condition.

e. Inspect seating surfaces of valves for damage.

f. Replace damaged parts. Always use new preformed packings and seal when reassembling.

8-4. Reassembly

a. Refer to figure 8-1 and reassemble the brake relay valve in the reverse order of disassembly. Note the following:

(1) During reassembly you should apply a light coating of oil on preformed packings (18, 21, 23, 24, 28, and 31) and the lip of the oil seal (10).

(2) After reassembly, test relay valve prior to reinstalling on trailer. Proceed as follows:

(*a*) Apply full air brake system pressure to supply port in top cover (5). Apply soap solution to delivery ports and check for bubbles. No leakage is permitted. If bubbles appear, diaphragm (3) is faulty and requires replacement.

(*b*) Apply system pressure to reservoir port in body (38). Apply soap solution to delivery ports, emergency port, and hole in end cap. No leakage is permitted. If bubbles appear at delivery port, the inlet valve (20) is faulty. If there are bubbles at the emergency port, the check valve is faulty. Bubbles at the end cap indicate a faulty packing on the inlet valve or on the piston (25). Replace valves or packings as necessary.

CHAPTER 9
REPAIR OF FRAME AND ASSOCIATED PARTS

Section I. LANDING GEAR

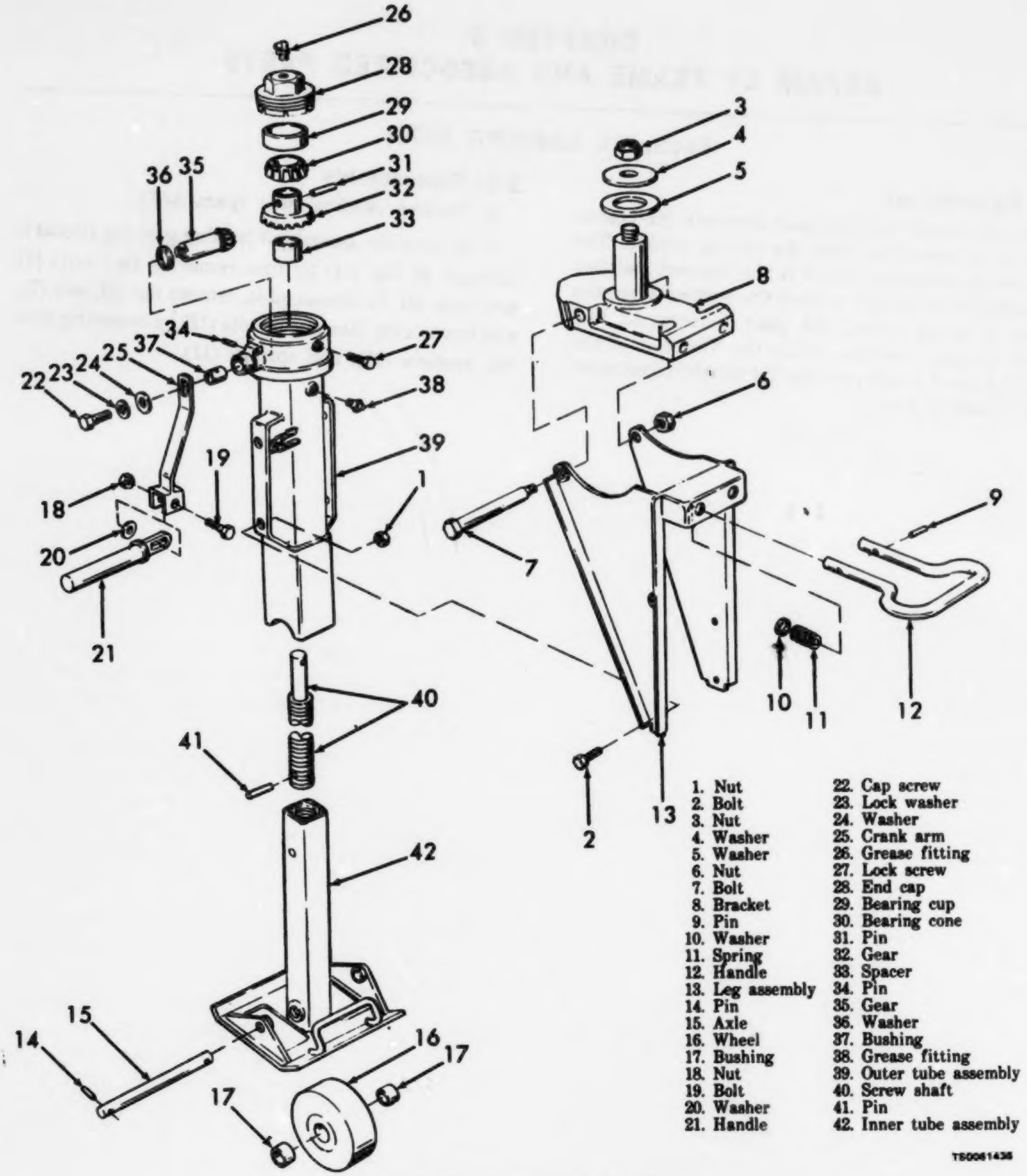
-1. Description

The retractable landing gear supports the trailer hen it is uncoupled from the towing vehicle. The ear can be unlocked, locked in the lowered position, nd adjusted for height to level the trailer. When the railer is being towed, the gear is retracted and ocked in upper position within the V-section of the rame. A hand crank provides for height adjustment f the landing gear.

9-2. Disassembly

a. Remove landing gear (para 4-71).

b. Remove the assembled landing gear leg (items 6 through 13, fig. 9-1) by first removing four nuts (1) and bolts (2). To disassemble, remove nut (6), bolt (7), and bracket (8). Remove handle (12) by removing pins (9), washers (10), and springs (11).



1. Nut
2. Bolt
3. Nut
4. Washer
5. Washer
6. Nut
7. Bolt
8. Bracket
9. Pin
10. Washer
11. Spring
12. Handle
13. Leg assembly
14. Pin
15. Axle
16. Wheel
17. Bushing
18. Nut
19. Bolt
20. Washer
21. Handle
22. Cap screw
23. Lock washer
24. Washer
25. Crank arm
26. Grease fitting
27. Lock screw
28. End cap
29. Bearing cup
30. Bearing cone
31. Pin
32. Gear
33. Spacer
34. Pin
35. Gear
36. Washer
37. Bushing
38. Grease fitting
39. Outer tube assembly
40. Screw shaft
41. Pin
42. Inner tube assembly

Figure 9-1. Landing gear, exploded view.

c. Disassemble the remaining portion of the landing gear by removing pins (14), axle (15), and wheels (16). You need not remove wheel bushings (17) unless replacement is necessary.

d. Remove handle (21) from crank arm (25) by removing nut (18), bolt (19), and washer (20). Remove crank arm by removing cap screw (22), lock washer (23), and washer (24).

e. Remove lock screw (27) to free end cap (28). Unscrew end cap and remove bearing cup (29) and cone (30).

f. Drive out pin (31) and remove gear (32) and spacer (33) from end of screw shaft (40) which will now drop out of outer tube assembly (39).

g. Remove gear (35) and washer (36) from outer tube assembly (39). You should not remove pin (34) and bushing (37) unless replacement is necessary.

h. Unscrew shaft (40) until pin (41) in end is aligned with holes in the inner tube assembly (42). Drive out the pin and then unscrew the shaft the remaining portion.

9-3. Cleaning and Inspection

a. Clean all parts with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

b. Inspect inner tube, outer tube, and leg for cracks, damage, broken welds, or bent condition.

c. Inspect all remaining parts for general serviceability.

d. Inspect bushings for wear, out-of-roundness, or scoring. Drive out damaged bushings and replace with new parts.

9-4. Reassembly

Reassembly is essentially the reverse of disassembly. Note the following:

a. During reassembly you should pack the gear head and bearing with grease. Also coat the screw shaft (40) with a minimum of 4 ounces of grease.

b. Adjust bearing cup and cone (29 and 30) to eliminate screw shaft end play. To adjust, turn end cap (28) in a clockwise direction. When end play is removed, install end cap lock screw (27). If necessary, back off end cap to nearest slot, then install lock screw.

c. If bushing (37) was replaced with a new part, you should make certain bushing notch lines up with hole for pin (34).

Section II. AXLE

9-5. Description

The trailer axle is a welded assembly and consists of an axle tube, with a trailing arm welded to each end of the tube. Wheel spindles, welded to the trailing arms, support the trailer wheels. A plate is also welded at each end of the tube to mount one end of the shock absorber. The axle tube is cradled in split bearings and is secured to the trailer frame by bearing caps. The trailing arms have provisions for mounting spring wear pads.

9-6. Removal and Disassembly

a. Remove the wheels, tires, hubs, and drums (para 4-57 and 4-58).

b. Remove the shock absorbers (para 4-69).

c. Remove the springs (para 4-70).

d. Remove the brake assemblies (para 4-65).

e. With the frame solidly blocked, support the weight of the axle. Remove the cap screws (1, fig. 9-2) and lock washers (2) that secure bearing caps (3) to the frame; remove the bearing caps and lower the axle (6) to the ground.

f. Remove bearing halves (5 and 7).

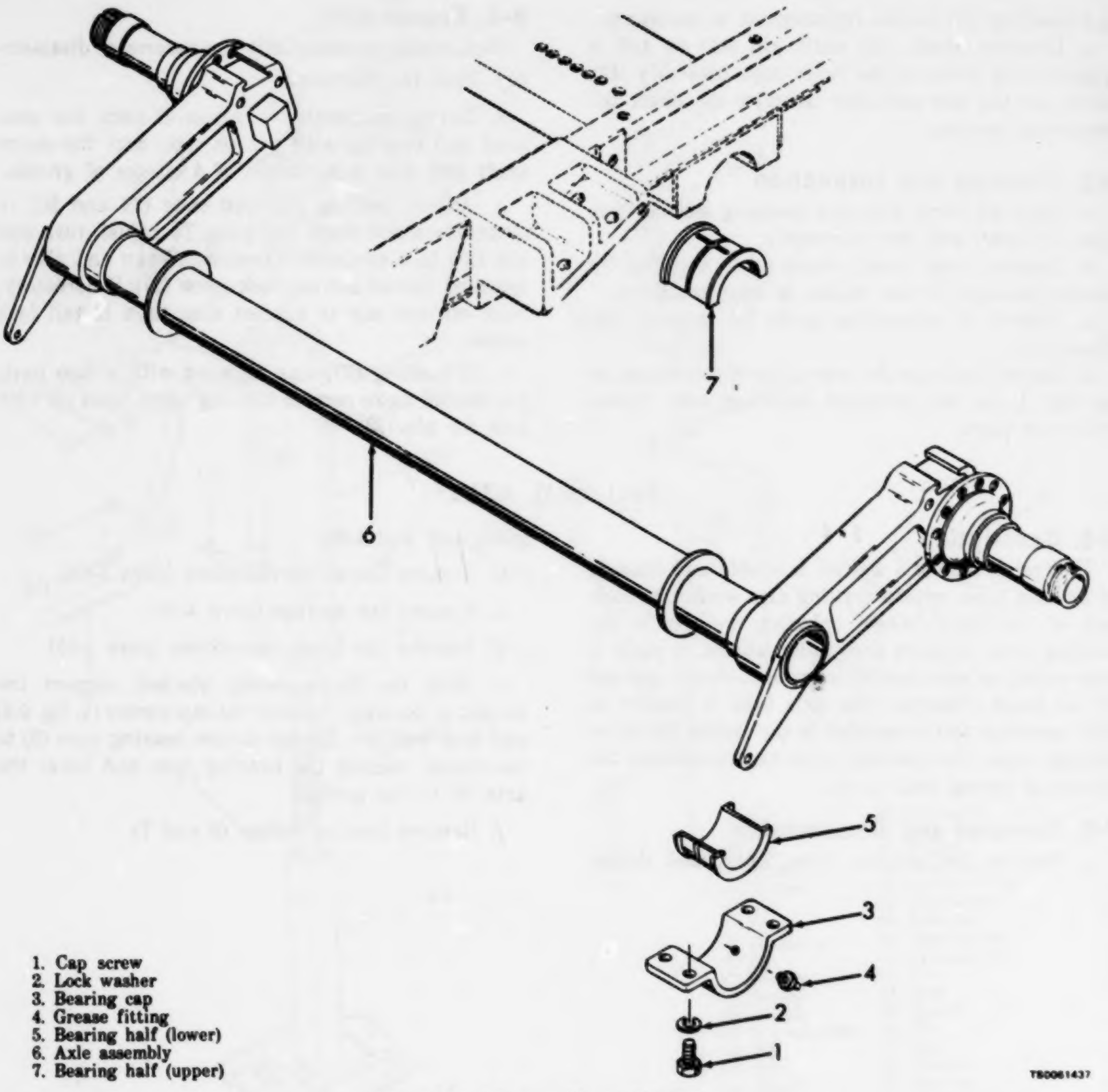


Figure 9-2. Axle assembly, exploded view.

9-7. Cleaning and Inspection

a. Clean axle and parts with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

b. Inspect axle tube, trailing arms, and spindles for cracks, bent condition, and broken welds.

c. Inspect spindle for scored or rough bearing and oil seal surfaces. Check for damaged threads; clean up as necessary.

d. Inspect axle tube bearing surfaces and split bearings for wear and scored condition. Replace damaged axle assembly and split bearings.

9-8. Reassembly

Refer to figure 9-2 and install the axle assembly. Note the following:

a. Coat bearing surfaces of axle tube and split bearings with grease.

b. Check axle movement after installation. Axle tube should pivot in the bearings without binding and without any free play. Some resistance should be felt when pivoting the tube.

c. Install brake assemblies (para 4-65).

d. Install springs (para 4-70).

e. Install shock absorbers (para 4-69).

f. Install hubs, drums, wheels and tires (para 4-57 and 4-58).

Section III. FRAME

9-9. Description

The trailer frame is an all-steel welded assembly consisting of two parallel frame rails with cross-members between the rails. Frame weldment also includes landing gear bracket, spring hanger brackets, lifting bars, and two upper halves of the axle bearing housing welded to the frame rails.

9-10. Removal

a. Remove four nuts, lock washers and bolts securing skid-mounted lubricating and servicing unit to trailer frame. Lifting rings are provided at four places on the top of the enclosure. Using suitable lifting equipment, lift unit off trailer frame.

b. Remove fenders (para 4-68).

c. Remove trailer lights and wiring (para 4-53 through 4-55).

d. Remove air reservoirs, air chamber and master cylinder assemblies, service hoses and tubing, relay valve, and air cleaners (para 4-60 through 4-64).

e. Remove landing gear (para 4-71).

f. Remove miscellaneous frame parts (para 4-72).

g. Remove axle assembly (para 9-6).

9-11. Cleaning and Inspection

a. Clean the frame assembly with dry cleaning solvent (fed. spec. P-D-680) and dry thoroughly.

b. Inspect the frame for cracks, breaks, broken welds, and other damage.

c. Straighten minor bends and reweld any broken welds.

9-12. Installation

Installation is essentially the reverse of removal.

APPENDIX A
REFERENCES

-1. Fire Protection

TB 5-4200-200-10	Hand Portable Fire Extinguishers Approved for Army Users

-2. Lubrication

C9100-IL	Identification List for Fuels, Lubricants, Oils, and Waxes
LO 5-4930-218-12	Lubrication Order: Lubricating and Servicing Unit: Power Operated; Trailer Mounted, 23 CFM Compressor, Reciprocating Gasoline Driven (Elliott Machine Model ENG-3A)

A-3. Painting

TM 9-213	Painting Instructions for Field Use

A-4. Radio Suppression

TM 11-483	Radio Interference Suppression

A-5. Maintenance

TM 9-2610-200-20	Care and Maintenance of Pneumatic Tires
TM 9-6140-200-14	Storage Batteries: Lead-Acid Type
TM 5-4930-218-24P	Organizational, Direct Support and General Support Maintenance Repair Parts and Special Tool List; Lubricating and Servicing Unit: Power Operated; Trailer Mounted, 15 CFM Reciprocating Gasoline Driven (Elliott Machine Model ENG-3A)
TM 5-2805-203-14	Operator, Organizational, Direct Support and General Support Maintenance Manual: Engine, Gasoline: Military Standard Models 4A032-1 and 4A032-11
TM 5-2805-203-24P	Organizational, Direct Support, and General Support Maintenance Repair Parts and Special Tool List: Engine, Gasoline: Military Standard Models 4A032-1 and 4A032-11

A-6. Shipment and Limited Storage

TB 740-90-1	Administrative Storage of Equipment
TB 740-97-2	Preservation of USAMEC Mechanical Equipment for Shipment and Storage

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the identified end item or component will be consistent with the assigned maintenance functions.

B-2. Maintenance Functions

Maintenance functions are defined as follows:

a. Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

b. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

c. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

d. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

e. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment/system.

f. Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DMWR) in pertinent technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

g. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered in classifying Army equipment/components.

h. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/assembly, end item, or system.

i. Replace. The act of substituting a serviceable like-type part, subassembly, module (component or assembly) in a manner to allow the proper functioning of an equipment/system.

j. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean, preserve, drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

k. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

l. Symbols. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

B-3. Explanation of Format

Purpose and use of the format are as follows, and shall be explained in the introductory portion of the MAC.

a. Column (1), Group number. Column 1 lists group numbers, the purpose of which is to match components, assemblies, subassemblies and modules with the next higher assembly.

b. Column (2), Functional group. Column 2 lists the next higher assembly group and the item names of components, assemblies, subassemblies and modules within the group for which maintenance is authorized.

c. Column (3), Maintenance function. Column 3 lists the twelve maintenance functions defined in B-2 above. Each maintenance function required for an item shall be specified by the symbol among those listed in *d* below which indicates the level responsible for the required maintenance. Under this symbol there shall be listed an appropriate work measurement time value determined as indicated in *e* below.

d. Use of symbols. The following symbols shall be used to prescribe work function responsibility:

C — Operator/Crew
O — Organization
F — Direct Support
H — General Support
D — Depot

e. Work measurement time. The active repair time required to perform the maintenance function shall be included directly below the symbol identifying the category of maintenance.

f. Column (4), Tools and equipment. This column shall be used to specify, by code, those tools and test equipment required to perform the designated function.

NOTE

No special tools, test or support equipment is required for the repair and maintenance of the lubricating and servicing unit.

g. Column (5), Remarks. Self-explanatory.

Section II. MAINTENANCE ALLOCATION CHART

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
Group No.	Assembly Group	Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild	Tools and Equipment	Remarks
01	LIFTING RINGS & ENCLOSURE								0					
	Lifting rings								0 0.1					
	Enclosure								0 0.5	0 3.0				
	Doors	0 0.1		C 0.1					0 0.5	0 1.0				
	Latch	0 0.1		C 0.1					0 0.2					
	Fuel filler assembly								0 0.2					
02	PUMP TRANSFER	C 0.1							0 0.3	F 5.0				
03	HOSE LINES & FITTINGS	0 0.3							0 2.0					
04	LIGHT ASSEMBLY	0 0.1							0 0.5					
05	ALCOHOL DISPENSER & AIR VALVE	0 0.1		0 0.2					0 0.3	0 1.0				
06	REEL ASSY HOSE	0							0	0				
	Reel	0 0.1							0 0.5	0 1.0				
	Hose	0 0.1							0 0.5					
07	AIR REGULATOR	0 0.1							0 0.5					
08	HIGH & LOW PRESSURE PUMP	0 0.3							0 0.5	F lb.				
09	CONTROL PANEL	0 0.2							0 4.0					
10	RESERVOIR	0 0.2		C 0.1					0 4.0					
11	LUBRICATING UNIT	0 0.1							0 0.1					
12	TOOL BOX	0 0.1							0 1.0					
13	AIR ASSY DRAIN	0 0.2		C 0.1					0 1.2					
14	FITTINGS	0 0.3							0 0.3					

(1) Group No.	(2) Assembly Group	(3) MAINTENANCE FUNCTIONS A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and Equipment	(5) Remarks
15	DRAWERS	O 0.1							O 0.5					
16	BATTERIES & BOX	O 0.2		C 0.2					O 0.5					
17	FRAME	O 0.1							O 0.4					
18	CONTROL VALVES G330830 "B" Unit 44711 & 44709 "A" Unit 411520 "A" Unit 3685 & 3683 "B" Unit	O 0.1							O 0.3	F 6.0				
19	FUEL TANK	O 0.1		C 0.2					O 1.0					
20	GENERATOR	O 0.2							O 0.5	F 3.0				
21	STARTER	O 0.1							O 0.6					
22	DIVERTERS	O 0.2							O 2.0	O 2.0				
23	ENGINE SHEAVE	O 0.2							F 3.0					
24	ENGINE ACCESSORIES													
	Switch oil temp	O 0.1							O 0.5					
	Trough oil drain	O 0.1							O 0.3	O 0.5				
	Engine	O 0.5		C 0.2					O 3.0	F 8.0				
	Sending unit oil	O 0.1							O 0.5					
25	COMPRESSOR	O 0.5							O *3.3	F 16.0				
	Belts	O 0.1			C 0.2				O 0.5					
	Air cleaner	O 0.1							O 0.2					
	Filter element	O 0.2							O 0.2					
	Intercooler valve: valve: unloader high-low	O 0.3			O 0.5				O 0.5					
	Crankcase	O 0.1		C 0.2					O 0.3					

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
Group No.	Assembly Group	A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	Tools and Equipment	Remarks
26	COMPRESSOR TANK	0 0.5	0 0.1	...	...	...	...	...	0 2.0					
	Lines	0 0.3	...	...	...	...	...	...	0 1.0					
	Valve	0 0.1	...	...	...	...	...	...	0 0.2					
27	VALVE RELAY	0 0.2	...	...	...	...	...	...	0 0.5	F 2.0				
28	MASTER CYLINDER	0 0.2	...	0 0.3	...	...	...	...	0 0.7	0 1.3	...	...	...	I-A
29	AIR CHAMBER	0 0.1	...	...	...	...	...	...	0 0.3	0 0.6				
30	AIR FILTER	0 0.2	...	0 0.2	...	...	...	...	0 0.5					
31	AIR TANK	0 0.1	...	C 0.1	...	...	...	...	0 0.5					
32	BRAKE LINES	0 0.3	...	...	...	...	...	...	0 4.0					
33	LIGHTS													
	Clearance	0 0.2	...	...	...	...	...	...	0 2.5					
	Stop	0 0.1	...	...	...	...	...	...	0 1.0					
	Reflector	0 0.1	...	...	...	...	...	...	0 0.5					
34	CABLE ASSEMBLY	0 0.1	...	...	...	...	...	...	0 0.1					
35	LUNETTE	0 0.1	...	...	...	...	...	...	0 0.5					
	Safety chains	0 0.1	...	...	...	...	...	...	0 0.5					
36	CHOCKS, BLOCKS WHEEL	0 0.1	...	...	...	...	...	...	0 0.2					
37	FENDERS	0 0.1	...	...	...	...	...	...	0 4.0	0 5.0				
38	LANDING GEAR	0 0.3	...	...	...	...	...	...	0 0.4	F 8.0				
39	WHEELS	0 0.2	...	...	...	...	...	...	0 0.4					
40	HUB AND DRUM	0 1.0	...	...	...	...	...	...	0 1.0	0 1.0	...	...	...	I-B

(1)	(2)	(3) MAINTENANCE FUNCTIONS											(4)	(5)
		A	B	C	D	E	F	G	H	I	J	K		
Group No.	Assembly Group	Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild	Tools and Equipment	Remarks
41	WHEEL CYLINDER	0 2.0	... ...	... ...	... ...	... ...	... ...	... ...	0 2.4					
42	BRAKES	0 3.5	... ...	... ...	0 0.5	... ...	... ...	... ...	0 4.0	0 2.0	...	...	...	I-C
43	AXLE	0 2.0	... ...	... ...	... ...	... ...	... ...	... ...	F 10.0					
44	CAT WALK	0 0.1	... ...	... ...	... ...	... ...	... ...	... ...	0 0.5	0 1.0				
45	FRAME	0 0.5	... ...	... ...	... ...	... ...	... ...	... ...	F 14.0	F 20.0				
	Shocks	0 0.1	... ...	... ...	... ...	... ...	... ...	... ...	0 0.5	0 0.5				
	Springs	0 0.2	... ...	... ...	... ...	... ...	... ...	... ...	0 2.0	0 2.0				
	I-A	Replace Diaphragm												
	I-B	Turn or Grind Drum												
	I-C	Replace Brake Shoes												

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(NOT APPLICABLE)

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